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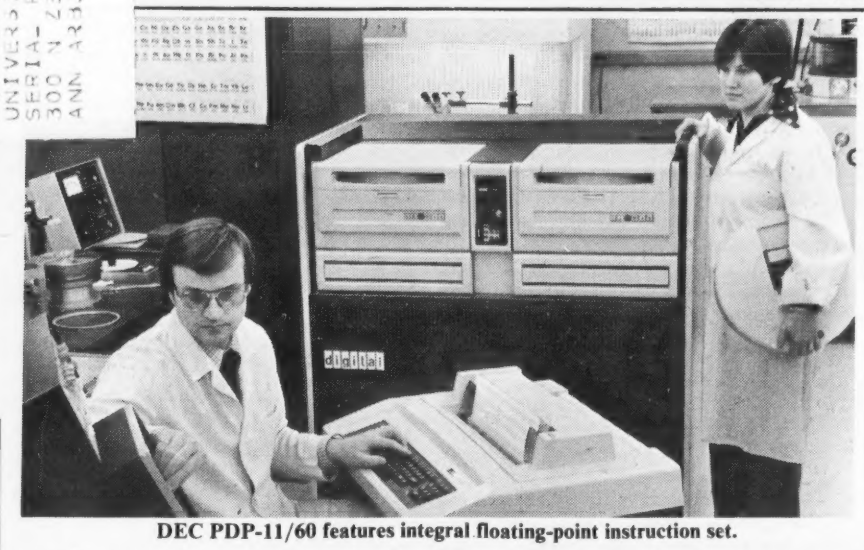

DEC PDP-11/60 features integral floating-point instruction set.

DEC Extends Cache Memory Use With Introduction of PDP-11/60

By Esther Surden
Of the CW Staff

MAYNARD, Mass. — Digital Equipment Corp.'s PDP-11/60 introduced last week brings cache memory — formerly the realm of the firm's PDP-11/70 supermini — to a DEC general-purpose, mid-range minicomputer.

The PDP-11/60 also features an integral floating-point instruction set said to allow the system to speed the execution of DEC's Fortran-IV-Plus language. Without this feature, the system would take three times longer to execute the Fortran instructions, according to a spokesman.

Designed for laboratory, industrial and educational use, the PDP-11/60 falls into the performance range of the firm's PDP-11/45 but costs about 25% less, he said, adding DEC will continue to sell the PDP-11/45.

The PDP-11/60 is available in both end-user and OEM versions. The end-user version is an integrated system configuration including 256K bytes of memory, two disk drives with a total capacity of 28M bytes and an LA 36 hard-copy terminal. The CPU and memory are available separately to OEMs, the company said.

Present PDP-11 end users cannot upgrade to the 11/60 processor without replacing their entire systems, the spokesman explained, because the unit is supplied to end users integrated "on a cabinet level."

The PDP-11/60 CPU is microprogrammable. Using cache memory, it features a 532 nsec "effective" cycle time, DEC said. Cache memory for the 11/60 is the same 2K-byte size as the cache on the firm's 11/-

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Actual Cost of Privacy Act Much Less Than Expected, OMB Reports to Congress

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. — The costs of implementing the Privacy Act of 1974 are "substantially less" than originally estimated by the Office of Management and Budget (OMB), according to a survey of federal agencies conducted by OMB last summer and published here recently.

As predicted, granting individuals access to their records represented the single largest operating cost, OMB said. Access cost taxpayers $10.7 million, or 29.2% of the funds agencies had allotted for implementing the Privacy Act.

The start-up costs connected with fair recordkeeping practices for 85 of the 88 agencies surveyed were $29.5 million between Jan. 1, 1976 and Sept. 30, 1976. Overall Privacy Act operating costs for these agencies between Sept. 27, 1975 and Sept. 30, 1976 were estimated to be $36.6 million, according to OMB's report to Congress.

These figures were considerably below OMB's 1974 estimates, which indicated the cost of implementing the House version of the Privacy Act would be on the order of $200 million to $300 million annually over the next four to five years, with an additional one time start-up cost of $100 million expended within the first two years.

At the time OMB made its estimates, it warned Congress of the extreme difficulty of reliably estimating the cost of privacy legislation without any experience operating under it. In its report, the Executive Office of the President again urged caution in taking these figures as gospel.

Largest Single Component

In analyzing the agency responses, OMB found compliance with the Privacy Act's publication requirements was "by far the largest single component of start-up costs," accounting for $13.5 million, or 46%, of the total $29.5 million.

"This represents an average of $2,000 per system," the report said.

The cost of developing and publishing rules, which is not necessarily a function of the number of systems an agency has, was also included in this figure, OMB stated. On a continuing basis, the budget agency estimated, the effort involved in preparing rules and notices of record systems will cost $4.4 million, or 12%, of Privacy Act operating costs.

(Continued on Page 4)

User Urges Nonregulated Unit of AT&T

By Ronald A. Frank
Of the CW Staff

WASHINGTON, D.C. — AT&T should provide data communications equipment on a nonregulated basis, according to one of the country's largest telecommunications users.

Under current law, the Bell System is limited to offering only tariffed, regulated devices.

AT&T should be required to establish a fully autonomous, nonregulated organization to develop, market and maintain terminals, modems and similar equipment, according to Robert Bennis, director of telecommunications at Westinghouse Electric Corp.

Presenting this user viewpoint at a DataComm 77 "town meeting" session here recently, Bennis said it is not practical to draft a regulation that ensures against abuse and, at the same time, encourages technological innovation and avoids regulatory paralysis "brought about by interpretive arguments.

"The user, the supplier and the common carriers have already paid dearly for our inability to recognize this fact. In the process of trying to protect, acquire or increase our share of the action, we have incurred increasing expense, compromised our systems and made a shambles of our planning process," Bennis told the session attendees.

FCC Should Favor User

The Federal Communications Commission (FCC) should act to protect the user public and should favor "the broad user interests over those of any particular supplier or supplier group. The user public's interest demands universal availability of terminal and incidental communications equipment whether supplied by common carriers or others," he said.

The post-Carterfone environment, in which alternative sources of equipment have become available, is "most advantageous to users," he added.

The commission should recognize that "computers are an indispensible tool of communications as well as data processing. The carriers must be free to utilize technologically innovative equipment that is fully adequate to meet the communications needs of users," he said.

CW Photo by R. Frank
Walter Hinchman

There is ample opportunity for the FCC, Congress or the courts to prohibit common carriers from participating in the business of DP without limiting their innovative opportunities to provide new communications services, Bennis continued.

Any prohibitions which are required should "be framed in terms of the purpose and effect of the services provided and not in terms of the processes or equipment utilized," he said.

Referring to the proposed definitions put forth by the FCC in the reopened Computer Inquiry, Bennis said the "present and proposed regulations use a technological segregation method to prohibit common carriers from using certain processes or certain kinds of equipment."

Users don't object to a prohibition against common carriers participating in the business of DP. But the commission must as-

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Fla. to Refund Software Taxes; Other States Deciding Positions

By Molly Upton
Of the CW Staff

The Florida Department of Revenue has announced it will consider refunding taxes on the sale of software that were collected before they were ruled illegal in a recent administrative hearing.

But Florida isn't the only state where tax officials are attempting to tax software or services and where users and vendors are moving to strike or at least clarify the laws being used to justify taxing the sale of software.

Actions have been reported in Alabama, Wisconsin, New York, New Jersey and California.

In Florida, about three or four firms have applied for refunds, a Department of Revenue spokesman said. The state has notified those firms it knows have been collecting taxes on software sales and will accept refund applications for three years from the date the tax was paid, in accordance with state law, the spokesman said.

The refunds were begun as a result of an administrative hearing requested by Nova Computing Services, Inc., which determined that Florida statutes for sales tax do not authorize taxation of intangible property such as software [CW, Jan. 17].

Not Taxable in Alabama

In Alabama, the 10th Circuit Court has upheld a lower court decision that software is not taxable [CW, Nov. 15].

That decision was rendered in the case brought by Central Computing Services, Inc. (CCS), which used the same argument that was successful in Tennessee in the case

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Software Ruled 'Tangible'

User Told to Return Programs to EDS

By Ann Dooley
Of the CW Staff

NEW YORK — Declaring software to be a "tangible" commodity, a federal judge here last week ordered F&M Schaefer Brewing Co. to return its applications software to Electronic Data Systems Corp. (EDS), pending further litigation.

U.S. District Court Judge Constance Baker Motley enjoined Schaefer from using the system unless it gave EDS $1.3 million.

EDS was also told to put up a $2.6 million bond dependent on the outcome of Schaefer's original suit, scheduled to be heard in November.

The hearing was a preliminary action to Schaefer's original suit claiming $115 million damages [CW, Sept. 13]. The hearing was brought by EDS to determine if Schaefer could be ordered to return the systems.

The granting of the repleven action enables EDS to take back the system even though money has been paid toward it by Schaefer.

Last week's action was not to determine damages, but just a claim to get the system back until the case can be decided on its merits.

Schaefer, represented by Thomas K. Christo, originally brought suit against EDS claiming the facilities management firm had developed an inadequate system that was substantially similar to Schaefer's original system.

In 1975, six years after the original contract began, Schaefer took over systems operations from EDS under an early cancellation clause in the contract.

The brewer failed to pay the cancellation fee covered in the contract because it claimed EDS had not honored its initial contract for development of a new system.

Schaefer claimed fraudulent practices by EDS when the firm misrepresented creating a new system, according to the defense. Schaefer was therefore not liable to honor the contract.

EDS, represented by the Kaye, Scholer, Fierman, Hays and Handler law firm from New York and the Hughes, Luce, Hennessey, Smith and Castle firm of Dallas, claimed the system was indeed newly created and filed a counterclaim for payment or permanent return of the system.

EDS stated payment under the contract was not dependent on the quality of the system. The firm further claimed Schaefer deliberately made misleading statements to induce EDS to turn the system over without planning to pay the early cancellation fee.

System Based on Concepts

The disputed system consists of magnetic tapes and disk packs containing computer programs and support documentation on Schaefer's business operations. It also contains I/O formats, flow charts, narrative descriptions and operating instructions.

Schaefer claimed the system was based on concepts and therefore could not be returned. Christo likened software to a musical song which can be recorded over and over again or even remembered and sung without the recording.

Schaefer contended that merely handing over a tape would not constitute handing over the system.

EDS' attorneys' claimed that the system consisted of "identifiable property which constitutes replevin."

The question of intangibility appeared to be a critical one to the decision of the replevin motion, but was passed over as insignificant by Motley.

The judge asked many questions of both parties that revealed little knowledge of computers, software and how the systems work. Further, she did not seem to fully understand the implications or concepts that were being decided.

Concurring with EDS's claim that software is a tangible commodity, she called much of Schaefer's testimony and evidence "irrelevant" to the case.

Although possessing little apparent knowledge of computer technology, Motley decided the EDS system was substantially a different and better one than Schaefer's original system because it used tapes instead of cards and a different language.

At one point, she stated the card system was obsolete and "can't be operated on a modern system."

The court found that EDS did develop a more modern and efficient system, that Schaefer's reasons for not paying the agreed upon early penalty fee were inadequate and that Schaefer deliberately took over the system without intending to pay any fee.

From these findings, Motley said EDS had presented a prima facie case and ruled in favor of EDS.

EDS attorneys would not comment on the decision or the case while the trial was still pending and even refused to disclose their own names.

Christo's only comment on the decision was "the order was improper and we're going to seek an immediate appeal."

After the decision was handed down, another Schaefer defense attorney, who refused to identify himself, complained the judge called Schaefers' witnesses out of order, many questions were deemed irrelevant by the court and the concept of software intangibility was not allowed sufficient explanation.

The Schaefer defense stated this decision would have bearing on its claim for damages. The trial on its merits, which will determine damages, will begin on Nov. 14, 1977.

Stock Bid Costs IBM Over $712 Million

ARMONK, N.Y. — IBM received about 2,546,000 shares of its own stock in response to its offer to buy at least four million shares at $280 each [CW, Feb. 28].

Purchasing the shares tendered will cost IBM $712.8 million. Four million shares would have cost $1.12 billion.

The price of IBM stock during the buying offer rose from $270.10 the day before the offer began to $284.50 the day it expired.

At year-end 1976, IBM had 150,766,927 shares outstanding. The mainframer also had cash and equivalents totaling $6.16 billion compared with $4.77 billion at the end of 1975.

During the offer, the brokerage firm of L.F. Rothschild & Co. expressed its view that, in addition to indicating IBM's belief that its shares are undervalued, the tender might also help smooth the supply-demand distortions for IBM's shares.

"IBM's outstanding qualities as an investment ensured it a place as a large core holding in most institutional portfolios," the broker said.

With the trend toward portfolio diversification, however, IBM is "often being used as a source of cash, since it has generally been 'overowned' relative to its 6.5% Standard & Poor 500 weighting," he added.

Some analysts believe much of the tendered stock came from institutional investors reducing their "disproportionate" holdings of IBM stock.

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Senate Gets Second Try at Creating Grants Data Base

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. — A bill that would establish a computerized system for dispensing information on federal domestic assistance programs to state and local governments has been introduced by senators Edward M. Kennedy (D-Mass.) and William V. Roth Jr. (R-Del.).

Similar to a bill that was passed by the Senate last year but never got out of the House of Representatives' Government Operations Committee, the proposed Federal Program Information Act would provide a single source of current data on federal grants and loans.

Cosponsored by senators Edmund S. Muskie (D-Maine), Charles H. Percy (R-Ill.) and Lawton Chiles (D-Fla.), the bill calls for a system to be operated and controlled by the Office of Management and Budget (OMB), the governmental unit now responsible for issuing the annual hard-copy *Catalog of Federal Domestic Assistance.* Last year's version of the bill had designated the General Services Administration as the agency responsible for the system.

The new bill provides for the transfer of the Federal Assistance Program Retrieval System (FAPRS) — the computerized program that sparked congressional interest in such a system — from its home in the Department of Agriculture to OMB.

FAPRS, created by Paul R. Kugler and the Plans and Programs Staff of the Rural Development Service at the Department of Agriculture, would form the nucleus of the OMB center, Roth suggested.

The center would have a director within OMB and would continue to publish various versions of the *Catalog of Federal Domestic Assistance.*

The new bill calls for a system that can provide financial information on the amount of funding each program received as well as how much money actually remains for which communities may apply — an improvement over Kugler's original system.

Kugler and his staff are currently working to develop the capability to track grant funds on-line to meet this requirement. The system already tells inquiring communities what programs are available and pinpoints the ones for which they are eligible.

The bill suggests a total of $2.9 million be spent on the system and developing the center over a three-year period.

'Art of Grantsmanship'

"The art of federal grantsmanship — the ability to identify, apply for and receive federal grant awards — has become a major impediment to small or disadvantaged communities, school systems and colleges trying to obtain a fair share of federal grant money," Roth said in a statement introducing the Federal Program Information Act and printed in the *Congressional Record.*

Kennedy noted "in many instances states and larger cities spend a considerable amount of money maintaining Washington representatives to keep abreast of changes in federal programs.

"Smaller cities and towns that cannot afford a full-time 'grantsman' are penalized by receiving less than their fair share of participation in federal programs," he said.

Both Kennedy and Roth sponsored this legislation based on their belief the government has a responsibility to provide "sunshine" for federal assistance through "full, fair and timely disclosure of program information."

In 1950, federal grants to state and local governments totaled $2.2 billion; the total is expected to exceed $71 billion in fiscal year 1978, Roth noted.

Roth has personally led the battle to unlock information about the programs which draw on these funds. When he first came to Congress 10 years ago, he said, no one knew how many programs existed and there was no place to which state and local government officials could turn for full and complete information on federal programs.

He and his staff conducted a study in 1968 and 1969 to identify and describe every federal program by name and department. That study resulted in the catalog published by OMB ever since Roth's initial effort.

It was OMB that provided the chief resistance to the Kennedy-Roth bill last year, arguing the existing catalog provided enough information on available federal funding.

"Any intelligent person can use the catalog and do what FAPRS does," OMB assistant director for budget review Dale McOmber said last fall. The catalog is available on magnetic tape for those who want to use a search program on it, he stated.

James McIntire, a new deputy administrator at OMB, may take a different view of FAPRS, however. McIntire ran FAPRS in Georgia last year, where he was head of community affairs for the state government.

HIS Users Planning To Stockpile Parts

CHICAGO — A group of 17 computer users who own and maintain an assortment of older Honeywell Information Systems, Inc. equipment met here recently as a step toward establishing a self-help users association.

By stockpiling and exchanging spare parts, these System 200, 1201, 1250 and 2200 users hope to "ensure and enhance" the useful lives of their systems, according to George W. Jordan, president of Compucenters of Corpus Christi, Texas.

These users, who chose not to sign HIS maintenance agreements, have waited as long as 39 to 52 weeks for replacement parts as a result of official HIS policy that favors contract customers, Jordan indicated.

An HIS spokeswoman confirmed that the policy for providing spare parts to users without maintenance contracts is essentially unchanged. However, the leadtime required for ordering parts has been reduced to "up to 30 weeks."

This policy does not apply to Level 6 system users without maintenance contracts, she added. These customers are supplied with "optimal replaceable units" 15 to 30 days after receipt of order and, in emergency situations, HIS can turn an order around in 48 hours.

The users meeting here agreed to work toward establishing a system for stockpiling and exchanging spare parts and providing assistance to one another as needed.

The 17 users own about 80 systems.

Wilson Grabill, president of Integrity Systems, Inc. of Cincinnati, was elected chairman of the steering committee, and Jordan was elected treasurer.

Another meeting is planned here June 6.

ADR's Automated System Charter™ (ASC) Helps Mobil Oil Stay Ahead

Change at Mobil Oil's New York Headquarters DP Department is a way of life. Over 300 systems are in constant use. And this year 100 systems may be extensively changed and 20 new ones added. "Maintaining up-to-date, standardized systems documentation by hand would be nearly impossible," according to Client Services Supervisor, Jean-Louis Legrand.

ASC produces new documentation in minutes

Mr. Legrand recently helped Mobil Oil install ADR's Automated System Charter (ASC) as a primary tool for computerized documentation maintenance. By using ASC, Mobil has gained many advantages including the establishment of new and simpler standards for programmers. Each time there is a system change, the programmer describes the change on a form submitted through one of Mobil's Client Coordinators for entry into ASC. This results in an automatic documentation update which can be sent throughout the DP Department by printing out a completely new report, produced at only a fraction of the former cost. Reports which would have taken up to 4 days to organize and type manually are now produced in a few minutes — automatically, through ASC.

ASC lets Mobil run systems faster

ASC gives Mobil's Client Coordinator a comprehensive, uniform, and up-to-date tool containing all the instructions he needs to run a system. Because ASC automatically standardizes documentation, the Client Coordinator understands a system faster and can run even a new system after only a few hours of study.

"An important aspect of the ASC document is that it now contains a very clear definition of all the reports coming out of a system along with detailed instructions on how they are to be distributed," Mr. Legrand added.

Improved backup is important

ASC has enabled Mobil to record all system documentation on one tape, with JCL in one library and descriptive comments in another. By dumping these two libraries, Mobil has full backup of all or any part of their documentation. Any report can be reproduced in just a few minutes.

No longer any doubt about being up-to-date

"With ASC, being up-to-date is almost automatic. When changes recur, ASC gives our Client Coordinators the ability to quickly make a copy of the complete, updated document so that everyone can work with the latest information," said Mr. Legrand.

ASC improves system chart quality, cuts costs

"ASC has let us document a system in about half the man-hours we would have normally used. And we have the advantage that the results are more uniform and complete. We do not miss steps as we might in a manual report, and the system chart and program steps are always printed in the same way," Mr. Legrand concluded.

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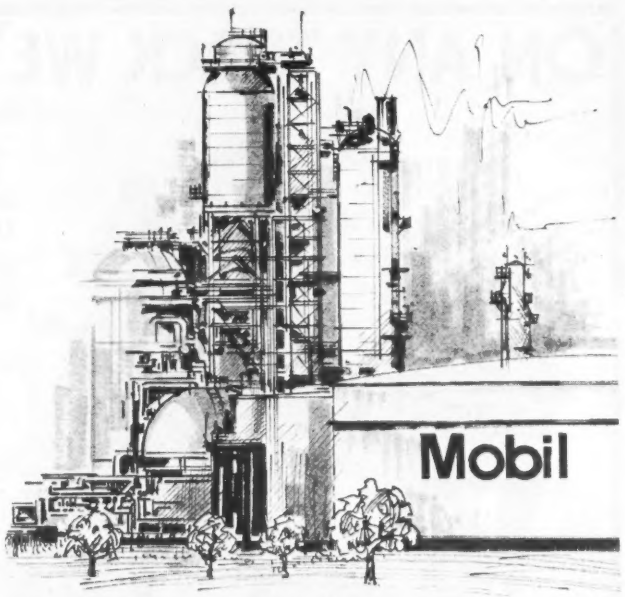

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OMB Finds Cost of Privacy Act Less Than Expected

(Continued from Page 1)

Personnel training by the agencies themselves and through courses developed by others such as the Civil Service Commission accounted for the second largest chunk of start-up costs — $6.8 million, or 23.2%, of the total, the survey report said.

Reports and other related administrative details required by the act comprised the third largest portion of start-up costs — $3.7 million or 12.7%.

On a continuing basis, these reports represented 11%, or $4 million, of the agencies' Privacy Act operating costs.

Tracking Costs Higher

The requirement that agencies keep records of disclosures of individuals' records was estimated to cost almost as much as granting access to records, OMB said. The $9.4 million or 25.7% of total Privacy Act operating costs expended on tracking disclosures was "substantially greater" than expected, the agency added.

By contrast, the cost of the additional security and control measures required by the Privacy Act was less than anticipated, the survey indicated. OMB suggested this may be due to a variety of factors, among them that some agencies with well-managed systems found they needed to do little more to comply with the act. Other agencies have not yet adequately addressed security requirements.

The agencies responding to the OMB questionnaire did not report significant cost reductions from systems eliminated as a result of privacy considerations.

The budget agency attributed this to the difficulty of determining whether and how many new systems have been scaled down or not developed at all as a result of the Privacy Act. Still another factor in the lack of cost reductions from systems scrapped might be the initial emphasis on complying with the publication requirements of the act and, therefore, to accept and report current systems "as is," OMB added.

"The Department of Defense accounts for approximately one-third of all systems of records and 48% of the total Privacy Act operating costs reported for all agencies," OMB said.

OMB suggested Defense's high expenditures might be the result of a greater understanding of access rights by its military and civilian personnel. Such a conclusion would be consistent with the President's First Annual Report on the Privacy Act which said that, except for access to law enforcement systems, most requests for access to records were being made by federal employees.

The cost of granting access to records for four Cabinet-level departments (the departments of the Treasury, Defense, Justice and Health, Education and Welfare), the Veterans Administration and the Central Intelligence Agency accounted for 26.5% of the total Privacy Act operating costs for all agencies and 93% of the cost of granting access, OMB said.

While related in part to the numbers of systems and records these agencies maintain, the cost of granting access also appeared to be a function of public interest in the records of certain agencies. Agencies such as the Justice Department maintain complex records, which adds to the cost and time consumed in granting access.

The agency said it remains to be seen whether the cost of granting access to records was the result of an initial wave of public interest or an indication of continuing and possibly increasing public demand.

Size Differences

In its survey, OMB identified 21 major agencies responsible for publishing 87% of the notices of record systems containing 98% of the records reported. These agencies accounted for 92.6% of the start-up costs and 97% of the operating costs in the executive agency's report to Congress.

"This would suggest that, as might be expected, start-up costs are more sensitive to the number of agencies and systems, whereas operating costs are more sensitive to the number of records," OMB said.

The cost of granting access to records was a significantly greater proportion of operating costs for the larger agencies (29.6%) than for the smaller agencies (14.8%).

OMB also found administrative overhead costs constitute a proportionately greater share of operating costs for smaller agencies — 33% — than for the larger agencies — 10.3%.

Finally, the cost of security and control in larger agencies is less than 4% while it accounted for more than 8% of the operating costs reported by smaller agencies.

"This could indicate there are economies of scale in system security: that is, it is relatively less expensive to establish security in larger systems, or that larger agencies already had adequate security systems in place," the survey report said.

Acting on the information received through its survey, OMB plans to determine whether the unexpectedly large cost areas, such as accounting for disclosures, can be reduced either by administrative action or by improvements in the law without defeating the objectives of the Privacy Act.

With additional experience with the act, OMB also hopes to learn whether the costs which are a function of external demand, such as granting access and correcting records, are greater or less than the agencies' estimates.

Overall, OMB's goal is to evaluate the cost-effectiveness of the Privacy Act, according to the survey report. Such a review must deal with the extent to which the act is preventing the development of new systems or constraining their content and use.

PDP-11/60 Has Cache Memory

(Continued from Page 1)

70 but, because it is organized in a different manner, it has a different hit rate.

DEC reported a 93% hit rate in cache for the earlier PDP-11/70 but an 87% hit rate for the PDP-11/60.

Memory for the system can be either MOS or core. The MOS memory has an error-correction code feature for greater reliability, the firm said, and battery backup is standard.

Optional features for the 11/60 include an external high-speed, floating-point processor, user-microprogrammed control store, extended control store and a diagnostic control store.

Called the "hot processor," the external floating-point processor for the 11/60 is used to augment the integral processor. For example, the unit performs double-precision multiply between registers at 3.74 msec; the auxiliary processor allows the system to be almost as "fast as some special-purpose systems optimized for a specific programming language," the spokesman claimed.

User, OEM Options

The optional user control store (UCS) allows a user to tailor the 11/60 to his particular application. The UCS includes a hardware module and software tools for microprogram development, according to DEC.

Another option, primarily of interest to the OEM, is the extended control store module that allows special functions developed with the UCS feature to be placed into programmable read-only memory.

The diagnostic control store module was designed for the "sophisticated" user who wants to replace malfunctioning CPU modules himself. The diagnostic module, which tests itself and the CPU in about 30 sec, helps bring down field service costs.

The 11/60 runs under DEC's RSX-11M operating system and is software-compatible with other members of the PDP-11 line, the spokesman noted. It supports Basic-Plus-2 and Dibol along with Fortran-IV-Plus.

The basic PDP-11/60 with 256K of memory, 28M bytes of disk and the hard-copy terminal in an integrated cabinet costs $44,700. The CPU and memory for OEMs costs $35,700.

The "hot processor" costs $5,600. The UCS option costs $5,000, extended control store is priced at $1,200 and the diagnostic control store costs $3,800.

Deliveries of the PDP-11/60 are slated to begin in June.

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NDR Looking for Way to Upgrade

Nlets Denies Use of its Network to Driver Registry

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. — The National Law Enforcement Telecommunications System (Nlets) board has voted against providing its network to meet the communications needs of an enhanced National Driver Register (NDR) system.

NDR, which helps keep drunk, reckless and other bad drivers off the roads by sharing license revocation information between the states and territories, had initiated plans to upgrade its system after a recent study by Rockwell International found states may drop out of NDR because they are not getting information fast enough [CW, Jan. 10].

The Nlets vote throws a monkey wrench into the NDR's plan to upgrade its slow batch-and-mail information exchange system into an efficient real-time system.

The NDR has asked the Nlets board to reconsider its decision. The state-based network is unlikely to do that, however, until its annual meeting this May in Atlanta, according to C.J. Beddome, Nlets executive director.

Without Nlets, the register will have to build its own dedicated system with dial-up lines or seek access to commercial alternatives, but these substitutes are more costly and present more serious privacy problems, a source close to the federal agency administering NDR said.

Described as "the most suitable alternative" to satisfying the communications requirements of an upgraded NDR that would provide the states with more timely responses to their license queries, Nlets is a network already in place and familiar with federal privacy regulations.

Nlets is also currently accessing state driver files, according to the study conducted by Rockwell International for the National Highway Traffic Safety Administration (NHTSA), which runs NDR here.

Despite these advantages to NDR, the Nlets board is concerned that the volume of traffic generated by the register will be too much for the network, according to Norman Darwick, director of the International Association of Chiefs of Police (IACP) Division of State and Provincial Police. The IACP participates in Nlets.

Full implementation of the enhanced NDR system will mean 80,000 to 100,000 inquiries will travel over the Nlets lines each day, primarily between 8 a.m. and 5 p.m., Darwick said. But he and the IACP would like to see Nlets accept an NDR pilot program, which would involve data from 10 states and mean between 5,000 and 6,000 driver license inquiries daily.

Nlets is currently operating at only 20% capacity, and state chiefs of police are talking to their representatives on the Nlets board to learn whether there are any other reasons behind the network's refusal to accommodate NDR, Darwick said.

Aware of the strain the full-blown NDR system could put on Nlets, the Rockwell report recommended that NHTSA agree to furnish the network with a minicomputer and a direct line between the NDR center here and the Nlets central facility in Phoenix, Ariz., if the pilot program indicated this additional equipment would be required.

The agency has accepted this suggestion, a source said.

NHTSA has no desire "to put inappropriate pressure" on Nlets; its officials would simply like the network's board to think about NDR again, the source added.

Paid for by $2.7 million in federal funds made available through the Law Enforcement Assistance Administration, Nlets is a state-owned organization, he noted.

Although the network is not subject to the provisions of the Privacy Act of 1974, it is involved in the transmission of criminal justice-related data and must follow Justice Department security and privacy regulations for such systems, the source said.

In addition to satisfying privacy and security requirements, NDR's use of Nlets would benefit U.S. taxpayers because it would make building a similar communications facility unnecessary, he stated.

Existing alternatives to Nlets are also more expensive and would present more serious privacy problems, the source suggested. If NDR were to go with Telenet, for example, the chances of misrouting information would be much greater since NDR would no longer be the facilities manager, he said.

The Data Transmission Co. was NDR's "second best alternative" until it went out of business last year, the source said.

The Rockwell report emphasized the importance of NDR's continued adherence to the dictates of the federal Privacy Act, but recognized the register would have to obtain the voluntary cooperation of the states.

NDR has no wish "to get in bed" with the law enforcement agencies, the source said.

Point Confirmed

IACP's Darwick confirmed this point. Despite its unanimous support last month of including NDR — at least in pilot form — on the Nlets network, IACP and the law enforcement agencies it represents won't gain easy access to driver records, he said.

Federal law now prohibits these agencies from getting their driver information from NDR; they must apply for license records through their own motor vehicle departments.

While NHTSA waits for a rehearing of the NDR project by the Nlets board, the agency is continuing to take the steps necessary to receive approval for the enhanced driver register system.

Rockwell has completed the second half of its study, which provides the system design and detailed specifications for development and integration of the software, hardware and procedural components of a rapid response capability for the NDR. NHTSA has accepted this study and will next seek approval from the Department of Transportation, an NHTSA spokesman said.

Once Transportation has approved the new system, the agency will take the NDR request to the Office of Management and Budget and from there to Congress, the spokesman said.

If the Privacy Protection Study Commission is still in existence after it reports to Congress in June, it will be asked to review the privacy plan for NDR, he added.

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Fla. to Refund Software Taxes; Other States Deciding

(Continued from Page 1)

of Commerce Union Bank vs. George M. Tidwell, according to CCS President Dewey H. Crim.

The State Supreme Court is currently reviewing whether to let the decision stand, Crim said, adding this is the normal sequence of events.

The state had sought $13,519.91 in retroactive use tax and penalties on banking packages the firm had obtained from University Computing Co.

CCS used the Tidwell argument — that software contained on the pack or tapes was intangible and the medium was inconsequential — and attached a copy of the Tidwell decision to its brief.

Wisconsin Deciding on Services

In Wisconsin, the legislature's Joint Finance Committee is considering a budget package that includes a paragraph which would make a range of services subject to the state's 4% sales tax. Software is already taxed here.

The proposal in Senate Bill 77, Section 844 would tax: "the sale of computer and data processing services, including time-sharing, designing or converting systems, programming, consulting, training, reformatting of data and computer printing."

Glenn Jacobson, general manager of Professional Data Processing, Inc., went to the hearing, but said he was dismayed by the lack of interest among other firms offering DP services.

"There seems to be a lot of complacency and the attitude that they can't fight the state so what are we going to do," he said.

To his knowledge, the proposed statute would be more encompassing than that in any other state, certainly more so than in New York, Jacobson said.

And it represents a dangerous precedent, he noted.

The joint committee indicated it expects the motion to yield $8 million a year in revenues, Jacobson said.

The budget package could come before the Joint Finance Committee as early as this week, a spokeswoman said.

New York Postponed Clarification

New York has postponed from March until April the issuance of clarifications of its regulations pertaining to taxation of software and DP services.

In the meantime, the state is assessing various software firms on sales made within the past three years, sources reported.

In New Jersey, a group of representatives from the services industry is requesting a meeting with Sidney Glaser, of the Department of Taxation, to clarify the state's position, according to George Raymond, president of Automatic Business Centers, Inc.

Raymond said the current New Jersey statutes are vague as to what is being taxed.

The group will be represented by the attorney retained by the Association for Data Processing Service Organizations (Adapso) — Sandy Goldberg of Roberts & Holland, a New York law firm.

California Holding Hearings

In California, Adapso is holding a meeting for firms interested in the California tax situation on March 23 at the Sheraton Hotel at the San Francisco airport.

A preliminary hearing with the California Board of Equalizers and Remote Computing Corp. (RCC) was scheduled for last week, at which time RCC's director of administration, Ryan Schmelz, planned to argue against the policy of taxing software.

RCC has been assessed on royalties it has been paying to out-of-state owners of programs it offers on its network.

The firm is protesting the assessment and is also petitioning for refunds of the taxes it has been collecting from users so it can refund these, he said.

The state assesses sales taxes on tangible personal property, Schmelz said. Since programs and data don't fall into that category, the collection of taxes on them exceeds statutory authority, he explained.

Furthermore, the state regulations do not look to substance but to the form, Schmelz said. This seems inconsistent and thus violates the state constitutional requirement of consistency in taxation, he added.

For instance, in both the royalty area and in data preparation, if the program or data is transmitted on-line to the recipient, there is no taxable transaction.

But if the same information is relayed via magnetic tape or card, it is taxable, he said.

Nonregulated AT&T Unit Urged

(Continued from Page 1)

sure the freedom of carriers to "provide a complete communications service involving long-term evolutionary improvements in communications processing equipment," he said.

The prohibition against carrier entry into the DP business should not be an obstacle to that freedom, he added.

The latest action of the FCC in amending the definitions proposed by the commission for the Computer Inquiry were explained by Walter Hinchman, chief of the Common Carrier Bureau.

The expanded scope of the new definitions are meant to address "all processing activities whether performed at a central location, at the customer's premises or at intermediate locations within or interconnected with a telecommunications network," Hinchman said.

A new definition of DP has been proposed to take into account that processing activities are not confined solely to a central computer and "to make our rules applicable to determining the nature of the carrier's processing activities — regardless of location or system structure," he said.

The FCC has proposed that DP be defined as the "electronically automated processing of information wherein the information content or meaning of the input information is in any way transformed or where the output information constitutes a programmed response to input information," Hinchman explained.

The proposed definition talks in terms of processing activities where an activity is the aggregate end result of a combination of operations irrespective of where they may be performed.

The commission would look to the end result of the processing activity in determining whether a carrier is engaged in data processing or communications, he said.

"The inquiry recognizes that it may no longer be possible or practical to distinguish between the two functions from a regulatory standpoint," he said.

Since it is now possible to combine DP and communications in a single customer-premise terminal, the commission has also asked for comments on whether such terminals should be considered a communications common carrier activity.

These comments also relate to the 1956 consent decree prohibitions against AT&T, Hinchman said.

In addition, the commission has asked for comments on ways to revise the Communications Act of 1934, currently being rewritten by the House Subcommittee on Communications.

These are just proposals and the commission is actively seeking comments from users and other interested parties.

"We encourage your participation in this proceeding so the commission can have the benefit of your knowledge and expertise in the area of data communications," Hinchman told the attendees.

Hopper Slated to Speak At NCR Users Conference

ST. LOUIS, Mo. — Capt. Grace M. Hopper, a leading computer industry figure since the mid-1940s, is among those who will address the Seventh Annual Federation of NCR Users Conference here April 24-27.

Hopper, whose pioneering efforts in programming languages influenced the development of Cobol, will discuss the past, present and future of DP.

Dr. John W. Demidovich, professor of computer systems analysis at the Air Force Institute of Technology School of Systems and Logistics, will keynote.

Other speakers will include Dr. Jack Stone of Computer Education International, Inc.; Gopal K. Kapur, president of Kapur and Associates and coauthor of *Fifty Questions the Chief Executive Should Ask of (Or About) His DP Manager*; and John M. Lusa, editor of *Infosystems*.

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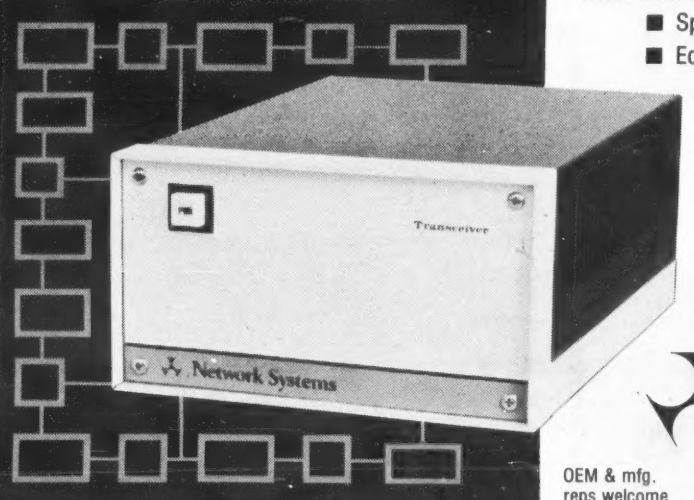

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Calls for Hearings on Allocations

Weicker Blasts TAS for Lack of Privacy Guarantees

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. — The Internal Revenue Service (IRS) has not made a sufficient commitment to taxpayer privacy in its plans for a distributed tax processing system, Sen. Lowell Weicker (D-Conn.) charged here recently.

During hearings by the Senate Subcommittee on Treasury, Postal Service and General Government Appropriations, Weicker said the study of the proposed Tax Administration System (TAS) by the Office of Technology Assessment [CW, Feb. 21] suggested "nothing to give me any confidence in the privacy of this system whatsoever" and called for separate hearings on the allocation of funds for the project.

The senator also said he fully recognizes the need for computer systems in the collection of taxes, but emphasized the IRS must guarantee the TAS would only be used for that purpose.

IRS administrators, including Patrick Ruttle, assistant commissioner for IRS Data Services, appeared before the Senate subcommittee to discuss the agency's budget for fiscal 1978. The IRS has allocated $3 million of its budget for evaluating, testing and approving vendor designs for TAS.

In defense of the laws already governing the IRS which would continue in effect when TAS is fully operational in 1985, the commissioners pointed out the IRS cannot disclose tax information without a court order.

IRS officials also noted they can't assure citizens that the agency's present computer system provides 100% protection in the area of privacy. If anything, TAS should bring the IRS much closer to this standard.

"We will learn from our experience with the old systems," one assistant commissioner said.

The fiscal 1978 budget, which begins in October, sets aside money for TAS in the event Congress approves the system by this summer [CW, March 7].

Should the House and Senate Appropriations Subcommittees do so, the IRS will issue a request for proposal (RFP) for TAS to computer vendors at that time, Ruttle said.

Strong Support Sought

The IRS would also appreciate strong support from the Carter Administration. Ruttle told the senators the agency will come back to them for formal approval of TAS once it has received an official go-ahead from the Department of the Treasury and the Office of Management and Budget.

The Treasury has already given TAS a nod and "does not favor an overhauling of the concept," another IRS official said.

The General Accounting Office (GAO) has also endorsed the system, following two separate studies, Ruttle stated. He noted IRS, in its TAS proposal, made a number of improvements to assure taxpayer privacy, based on extensive comments from the GAO.

The agency also has answered additional issues raised by the GAO last year. These include concerns that the system be developed in an evolutionary manner, that the necessary computing and communications equipment be available to make TAS work by the mid-'80s and that procurement plans and cost-benefit studies for TAS be updated.

As he had assured the House counterpart to the Senate Appropriations Subcommittee earlier in the week, Ruttle said the cost of maintaining the present IRS computer system between now and 1985 will be $627 million.

By mid-1985, the bulk of this equipment will be obsolete and the cost of replacements will approach $100 million.

The IRS can either spend $727 million to maintain the status quo or the anticipated $851 million to develop TAS, Ruttle stated. He added it is true the computer capacity now planned for TAS will not last beyond 1985, thus increasing the cost of the distributed network beyond that date.

IRS officials assured the senators they welcome the opportunity to appear before Congress in hearings on TAS.

NCC Not Forgetting Computer Hobbyists

DALLAS — The 1977 National Computer Conference (NCC) here will feature a Personal Computing Fair, a Personal Computing Exposition, two full days of program sessions and a National Club Congress as well as special interest sessions for computer hobbyists.

The Personal Computing Fair, scheduled to run June 13-16 — the four days of the NCC — will feature operational displays and demonstrations of individually and group-owned noncommercial projects.

Technical sessions will include two three-hour panel sessions on Wednesday to examine the past, present and future of personal computing as well as hardware for the computer hobby market.

Thursday's agenda contains a three-hour panel covering personal computing software, a variety of papers relating to personal computing and a panel on the future of retail computer stores.

Plans are being developed for the National Club Congress to enable representatives from clubs throughout the U.S. to swap ideas and discuss their activities.

Additional details are available from the American Federation of Information Processing Societies, the conference sponsor, at 210 Summit Ave., Montvale, N.J. 07645.

IEEE Seeking Director

NEW YORK — A search committee has been selected to seek a replacement for H.A. Schulke Jr., who resigned as executive director of the Institute of Electrical and Electronics Engineers, Inc. (IEEE) effective July 22.

Robert H. Tanner will chair the committee composed of John E. Barkle, Carleton A. Bayless, Donald G. Fink and Arthur Stern.

All IEEE members have been urged to submit names of people they believe are qualified to Tanner at IEEE headquarters, 345 E. 47th St., New York, N.Y. 10017.

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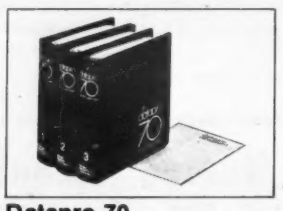

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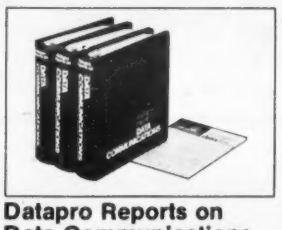

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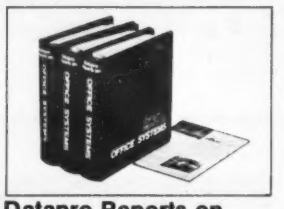

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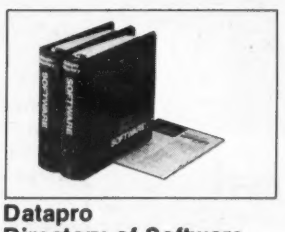

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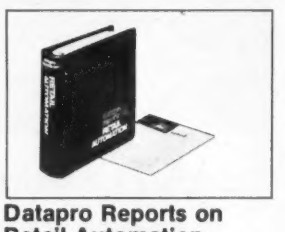

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What Would You Have Done?

The following two scenarios were among those studied by participants of the Computer Science and Technology Ethics Workshop held recently in Menlo Park, Calif., by the American Federation of Information Processing Societies and organized by the Stanford Research Institute.

To indicate whether you feel the parties involved behaved ethically, fill in the form included and return it to Computerworld *in the postpaid envelope included in this issue. Write "Ethics" on the outside of the envelope.*

Scenario A

A computer programmer working for a state department of health assisted in the development of an application system. The system had few controls over access by unauthorized persons and no monitoring or logging of access was performed. Data consisted of medical information on identifiable people.

The state had no laws controlling confidentiality of the medical data. However, the department had rules governing confidentiality and prohibited employees from accessing the system without authorization and from taking copies of data, but little was done to enforce them or monitor for violations.

The programmer felt the system did not adequately enforce the rules of confidentiality and resulted in increased and dangerous exposure of the data. He brought this to the attention of his immediate manager and finally higher management, but with no success. He was finally threatened with sanctions if he did not stop his efforts.

He violated the rules of confidentiality and easily obtained a copy of the data from the system consisting of medical information about himself. He presented the copy of data to a state legislator who revealed this action and the data with the programmer's permission to a legislative committee in a public hearing, and it was widely publicized in newspapers.

This caused great embarrassment to the agency, and the programmer was fired from his job.

Scenario B

The manager of a computer applications programming department in a large company is responsible for all applications programming throughout the company. Most of the programmers report to him. Several people in other departments also program, but must conform to the standards in the programming department.

All application programs to be run on a continuing production basis must be tested and approved by the quality assurance group in his department before they go into regular production use.

The top executive officers of the company are engaged in a massive fraud against the stockholders and other investors by inflating company assets. Significant evidence of the fraud is contained in the data files stored and processed by the computer. Several programs have been developed to assist in the fraud.

A programmer in the inventory control department and a programmer in the applications programming department are knowing participants in the fraud. The programs used in the fraud perform unorthodox functions that obviously don't contribute to legitimate functions.

For example, one program generates new records of nonexistent inventory items by copying and slightly modifying records of existing items.

Such programs have passed quality assurance testing on the pretext that they will be used to generate test master files for use in business simulations for the planning department. When the programs were released to the computer operations department for production, they were actually used to modify the master files.

The programming manager was unaware of the involvement of the programmers. The fraud-related programs were not suspicious to him.

Several programmers reported to him that unexplained, unusual activities were going on in several parts of the company. He was aware of severe financial problems and was told to do only what he was asked to do without question and not bother about the implications.

The fraud was ultimately discovered and the perpetrators prosecuted. The programming manager was identified as an unindicted coconspirator.

— — —

Scenario A — Programmer
Ethical__Unethical__No Ethics Issue __
Ethical Judgment: _____

Scenario B — Programmers
Etnical__Unethical__No Ethics Issue __
Ethical Judgment: _____

Scenario B — Manager
Ethical__Unethical__No Ethics Issue __
Ethical Judgment: _____

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Bayh Named to Chair Combined Senate Unit

WASHINGTON, D.C. — The Senate Judiciary Committee has combined its subcommittees on Constitutional Rights and Constitutional Amendments and chosen Sen. Birch Bayh (D-Ind.) to chair the new body.

The combined subcommittee will be called the Senate Subcommittee on Constitutional Amendments and Rights.

Bayh replaced Sen. John Tunney (D-Calif.), who took over as chairman of the privacy-minded Constitutional Rights Subcommittee after Sen. Sam J. Ervin Jr. retired from Congress in 1975. Tunney brought two issues, government intelligence gathering and criminal justice information systems, to the subcommittee's attention before his election defeat last fall.

Already the chairman of the Subcommittee on Constitutional Amendments, Bayh seemed "the logical choice to head the reorganized subcommittee," a spokeswoman for the senator's office said. He has chaired the Amendments Subcommittee since 1963.

Bayh has consistently favored various forms of privacy legislation — from the Privacy Act of 1974 to the Percy-Goldwater amendment banning unrestricted use of the Social Security number as a universal identifier and Sen. James L. Buckley's amendment providing for the confidentiality of school records, the spokeswoman said.

During the 94th Congress, Bayh sponsored legislation designed to limit the use of polygraph tests, she added.

The subcommittee's membership has yet to be chosen.

Murch to Speak at NCC

DALLAS — A. Douglas Murch, senior vice-president of the Prudential Insurance Co. of America, will speak at the National Computer Conference (NCC) here Wednesday, June 15.

Murch will be featured at a plenary session on data processing in the insurance field to be held at 1 p.m. in the Dallas Convention Center.

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Consider Various Scenarios

Workshop Attendees Ponder Question of Ethics in DP

By Molly Upton
Of the CW Staff

MENLO PARK, Calif. — Should a DPer "blow the whistle" on a project he thinks is poorly conceived and/or contrary to the public interest?

Should data be used without permission for a purpose other than the one for which it was originally intended?

Both the above situations embody ethical issues and are extrapolations of two of the 52 scenarios considered by attendees at a recent Computer Science and Technology Ethics Workshop. The meeting, sponsored by the American Federation of Information Processing Societies (Afips), was held here recently at the Stanford Research Institute under the direction of Donn B. Parker.

The National Science Foundation provided funding for the workshop, which drew over 30 participants from a variety of disciplines including philosophy and law as well as DP.

Public Discussion Necessary

Parker emphasized the need for public exposure of issues prior to the formulation of codes of ethics. Although various DP societies already have ethics codes, Parker said writing codes before much public discussion is putting the cart before the horse.

The conference was designed to generate observations which will become a report distributed by Afips Press, he said.

One of the prime audiences for the report should be educational institutions, according to Richard Waller of the British Computer Society. The report may also aid in drafting legislation in DP areas not adequately covered by existing law, another participant suggested.

Eventually the material may be distilled to produce principles such as those for a proprietary program unless specified otherwise, Parker said.

The scenarios fell into seven categories, as analyzed by some participants. These included conflict over obligations or implicit contractual agreements; disputed rights to an intellectual product; questions of the confidentiality of sensitive data or invasion of privacy; and conflicts between personal morality, professional ethics and organizational loyalty.

Test your own ethics on Page 8.

Other categories were responsibility for both direct and indirect social effects of computer applications; responsibility for influencing public opinion; and questions about the validity of computer tools in social and political decision making.

Why the need for awareness of ethical issues? DP technology is developing at a rate that outstrips legislation, one participant observed.

The DP community should increase its efforts to promote ethical considerations and help draft legislation that pertains to DP situations before Congress takes over the job, other participants suggested.

To illustrate the lack of ethical principles, several participants were surprised to find that in two similar scenarios, one in the gambling area and one in business, they ascribed weight to the gambling code of ethics and found themselves searching for the applicable ethical consideration in the business situation.

In many instances, laws are inadequate, participants realized as they grappled with the issues presented.

Just as medical experts realized the definition of death was inadequate after new techniques could keep hearts beating long after other parts of the body were essentially dead, so has the computer community recognized that DP technology has introduced numerous situations where the law is inadequate, Charles Reagan of the University of Kansas observed.

Key Question

One key question commonly considered was whether ethics should be consistent with the law or ask more of an individual than the law. "The law represents minimum morality," one lawyer contended.

Attorney Susan Nycum said law is essentially unsettled in much of the DP domain, especially in instances involving intellectual property such as computer programs.

In other instances the law is settled, but cannot be easily applied to computing, such as in unauthorized retrieval of data from remote sites, she said.

William Fenwick, another attorney, noted the current disagreement over sales taxes applied to software.

Joe Overton, legislative aide to Rep. Barry Goldwater Jr., observed there is no constitutional concept covering the relationship between an individual and the data collected about him.

Issue of Quantity

Another issue to which ethics, if not laws, may need to be applied involves the quantity in which data is easily obtained.

Although laws state certain personal information is public record, should the same apply when one can inexpensively and quickly acquire much larger volumes of that same type of information? the attendees asked.

Participants at the conference represented fields such as philosophy, corporate and academic DP, law, consulting, DP technology, government, psychology, accounting and journalism, Parker said.

Speech Experts Use DP to Write Rhetoric Echoing Voters' Views

By Ann Dooley
Of the CW Staff

PEORIA, Ill. — Politicians will be able to win elections before long by using a computer to analyze the subgroups within their constituencies and tailor their political rhetoric to match, according to two speech experts.

Dr. Donald C. Shields of the University of Missouri at St. Louis and Dr. John Cragan of the University of Illinois claim to have proved this during last year's Presidential campaign.

During the primaries, Cragan and Shields became interested in writing a speech that would "play in Peoria" — that is, appeal to "Middle America."

And they did exactly that. They tested a cross-section of Peoria citizens on 20 issues relating to foreign policy. The respondents ranked actual foreign policy statements taken from newspapers according to how they reflected their views, Cragan explained.

The statements were loosely classified into three views of American foreign policy. One view represented the "Cold War warrior" typified by Ronald Reagan, the second was a neo-isolationist view represented by Sen. Eugene McCarthy and the third was a balance of power stance portrayed by Henry Kissinger, according to Cragan.

Besides finding out citizens' views on foreign policy, the survey also determined the most effective style and specific phrases in which the respondent liked to hear his opinions expressed.

DP-Written Speech

The ranked statements were keypunched on cards and entered into an IBM 370/145 at the University of Illinois here. Through factor analysis and linear equation programs, the computer wrote a seven- to nine-minute speech that "would please the most and offend the least" number of people, he said.

An example from their all-American speech goes: "The People's Republic of China is a sovereign state, but we must not forget to support our ally, the Republic of China on Taiwan. I believe both governments can learn to live with the reality of each other."

"It's a bland speech; no one's going to march down the road with you," Cragan said. But when the speech was presented before a Peoria audience, it received an ovation.

Nothing Controversial

Since the speech says nothing controversial, it will help to avoid the "big error," such as the one former President Ford made in reference to Poland during the second Presidential debate, Cragan said.

"We used essentially the same process that speechwriters use, although they are not as scientific," he said. "In the last campaign, it was referred to as flip-flopping."

"With the message and language pretested, we know exactly what to say and how to say it," Shields added. "The only factor left out of our system is a good delivery by the candidate."

Computerized speech making would be a good system if the politicians wanted to mirror their electorate, but it wouldn't be very good on a leadership level, Cragan said. He feels the use of computers in political campaigns should be closely examined.

"We called up some local politicians just to see what they would say about it. They denied any interest in such a technique, but the press should be aware of the questions to ask, anyway," he said.

Although the political response has been guarded, seven or eight marketing firms have shown interest in the technique, he added.

The professors conducted the research as purely objective if somewhat cynical observers and said they would be "available to advise" any interested political candidates.

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'Balanced, Responsible'

EFT Commission Head Pleased by Report

By Toni Wiseman
Of the CW Staff

WASHINGTON, D.C. — The 26 commissioners of the National Commission on Electronic Fund Transfers (EFT) were very sensitive to the fact that when they were named, majority opinion held they would get nowhere because they knew nothing about DP and its technology.

But today that has changed, and most commissioners believe they have a real feeling for the dynamics of EFT, according to the commission's executive director, Jack Benton.

A major part of Benton's job has been to see that each commissioner got to the point where he knew exactly what was in question, he said.

Today, "if an issue brought up at a hearing is defeated, it's because the facts weren't there to support the view, not because the commission didn't understand the issue," Benton said in an interview here recently.

He had earlier admitted, however, that the commissioners' experience with terminals is "zilch" and "most still think [point of sale] is something Citibank invented."

Benton, who was appointed by former President Ford, came to the commission from TRW Electronics and previously worked for the Rand Corp. He is the only commission member with "hands-on" experience, he noted.

Benton doesn't feel the commission's work or its recommendations would have been different or would have benefited from its members having DP backgrounds, particularly since "every commissioner has a wealth of technical experience [from others in the industry] which he can draw on."

If the commissioners had been DP-oriented, it simply would have required 12 months of educating them in banking and government rather than DP, he commented, adding his opinion that technology is easier to teach in a short period than are finance and law.

Benton said he "feels extremely good" about the commission's interim report [CW, Feb. 28], which he described as "very balanced and very responsible."

"But not everyone is going to be happy with the recommendations," he conceded.

The recommendations in that report represent a blueprint for how EFT should develop in this country, effecting compromises which will be best for the country, he stated.

The National Commission on Electronic Fund Transfers recently released an interim report of its findings and recommendations to the President and members of Congress [CW, Feb. 28]. In a recent interview, the commission's executive director, Jack Benton, looked back over the past months and discussed the commission's development and progress.

Maintaining "there is a very constructive sense of pragmatism to the [report's] recommendations," Benton said "every compromise was made to benefit the consumer."

He explained that "compromise" was not used in the derogatory sense; rather, the commission had taken into consideration the many points of view presented in hearings, and its judgment was somewhere in between. "It was a question of developing group wisdom, something we could believe in."

As an example of the evolution of "group thinking," Benton remarked the commission initially didn't think privacy was even an issue in EFT.

That has changed dramatically, he indicated, referring to the report's recommendations.

EFT is part of a bigger problem — much larger dynamics than many people are aware of, Benton suggested. It is more than a question of technology and how financial services are distributed today.

"EFT seems to touch on so many things that otherwise do not link anywhere in the chain of events, so it's a good thing to hang on to," he said.

"Without EFT, there would be no consideration of how data communications, for instance, touches on how depository institutions operate internally."

Benton emphasized that contrary to most commissions, this one won't be making recommendations and disappearing. Instead, it is now entering a very important part of its life cycle — the feedback period.

"Now is the time for individuals and vested interest groups to get back to us, to present new facts and arguments to be looked at," he said. "I rather suspect that in October we will make a restatement of all these issues, but the burden of proof is on those who think our recommendations should be changed."

Benton said he hopes the DP industry will not develop unrealistic expectations about what the commission will do about questions of competition with common carriers, standards and security.

"What you can expect from the commission is that if, indeed, there is a problem here directly related to EFT — such as the role of [AT&T's] Transaction Network Service vs. others — then the commission will make strong recommendations to Congress [in its final report] about dealing with these questions," he said.

Total Communications Approach Seen Mobilizing Future Offices

By John P. Hebert
Of the CW Staff

BOSTON — Retail store management will combat the problems of slow productivity gains and rising costs for people and paper by implementing data communications in a total systems approach, according to Michael Levokove, marketing manager for AT&T's Distribution Industries.

Electronics may eventually help displace the office as a stationary base of operations, Levokove said. If it does, it will have as dramatic an impact as the telephone did 100 years ago, the keynote speaker told attendees of the National Retail Merchants Association's Seventh Annual Telecommunications Seminar here recently.

In "Office Communications of the Future," Levokove envisions a drastically different "scenario" from today's typical environment.

The flexibility of data communications as part of a total systems approach will afford management the freedom to work from a place other than the central office site, Levokove said.

The office of 1985 to 1990 will have no secretaries. Instead, there will be "administrative managers" who will be specialists in the fields of management, information storage and word processing, working from scattered administrative support centers, Levokove predicted.

The use of CRTs or other visual display terminals will be an integral aspect of this scenario because they will allow the specialists to interact with a company's computer and information storage devices, he said.

The terminals will double as calculators and as parts of conferencing systems to promote more frequent management meetings. This may be feasible late in this decade or in the early 1980s, he predicted.

Levokove admitted the future office setting may not look exactly like the one he depicted, but maintained there would be a different concept in the division of labor than there is today.

Although the manufacturing arena has enjoyed an 83% increase in productivity in the last 10 years, the office environment has produced a mere 4% increase in productivity while expenses have doubled, he said, citing a recent Stanford Research Institute study.

Additional statistics from the study showed 70% of office costs are absorbed by people, with executives accounting for the major portion.

Electronic communications provides the means for tying all of these things together, he added, noting that the total systems approach must consider the user. The user will look to vendors for modular, flexible systems to make him more efficient.

The move toward data communications and electronic storage "makes a lot of sense" because now 35% of the paper information in a company's files is never accessed and 90% can be discarded after one year, he said.

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Study Finds DP Budgets Up Average 10.2% This Year

By Ann Dooley
Of the CW Staff

MENLO PARK, Calif.— Large organizations will increase their 1977 DP budgets an average 10.2% over 1976 figures, according to a survey by Input, a consulting firm here.

DP budgets in the process manufacturing, banking and utilities sectors will grow 12% while increases in the retail sector will reach only 6%, the survey forecast.

About 50% of the organizations surveyed are installing or expanding on-line capacity with long-term plans for distributed DP.

The most dramatic increase in equipment purchases will be for terminals, data communications equipment and secondary processors, according to the survey, which concentrated on the top 800 companies listed in Fortune 500 and also covered the federal government and large state and local governments.

Outside Service Expenditures

Expenditures for outside services will continue to grow at a rate of 16% for the current year, Input found.

The banking industry, the heaviest user of outside services, will spend 27% of its DP budget on such services while the insurance industry spends 19.2%, the utility industry spends 15.7% and diversified financial firms spend 13.5%, according to the survey.

Industries in which salaries are low, such as banking and insurance, must rely on outside services to supplement their in-house capabilities, Input explained.

Federal agencies proved to be the largest per-unit spenders on outside services, spending 21.8%.

In the case of the federal government, outside services allow agencies to perform the required processing without exceeding their fiscal year budgets, Input said. Such services also allow agencies to avoid the lengthy justification and approval procedures required to obtain their own computers.

The largest budget increases will be in the financial and government sectors, according to the survey.

Remote computing services and software products are the fastest growing types of service-oriented organizations, while batch processing and educational services are the slowest, the survey said.

Growth Expected to Slow

Next year's budget growth is expected to slow and level off to 9% over all the sectors, according to the survey.

DP expenditures in the process manufacturing sector, led by the petroleum industry, will continue to expand 12% in this time frame, while retail businesses' budgets will just keep up with inflation, the survey said.

The ratio of DP expenditures to revenues shows that airlines, included in the transportation sector, tend to use computers more extensively than any other industry because of their on-line reservation requirements, according to the survey.

The discrete and process manufacturing sectors are the biggest spenders based on per-company expenditures. The main reason for this is the widespread and growing use of computers for production and inventory control and computerized process control as well as for administrative applications.

Another reason for the large expenditures is the industries' need to link separate facilities to integrate data.

The study concluded that half the surveyed firms are interested in installing distributed processing systems ranging from secondary processors in remote locations to multiapplication intelligent terminals.

It also concluded that DP activity is not always centrally coordinated and minicomputer systems are purchased locally to solve single applications without regard to an overall DP strategy.

Programs Too Difficult

As for software to operate these systems, users are generally unhappy with IBM's network and data base management systems because the programs are difficult to learn, implement and maintain, according to the survey.

The survey suggested users are looking for vendors who can develop programs that are more efficient and easier to use.

Users are also interested in service firms that emphasize software and system designs which facilitate data gathering and analysis from remote data bases, the report said.

Survey Sectors

The survey broke the user sectors into life insurance, banking, retailing, discrete and process manufacturing and diversified financial — including brokerage, finance, savings and loan companies and nonlife insurance companies.

Discrete manufacturing includes shipbuilding, apparel, printing and publishing, electronics and furniture among others. Process manufacturing encompasses petroleum refining, mining, textiles, chemicals, food, tobacco and others.

Other sectors included transportation, utilities, nonsecure functions of the federal government and state and local governments of the 15 largest states and five largest cities in terms of budget.

This survey population was selected because it controls over 60% of all DP spending and tends to take the lead in trying new products, systems and technologies, Input explained.

These large organizations also tend to be less affected by short-term economic changes and events than do smaller organizations.

DP Managers Interviewed

Data was obtained from direct interviews with DP managers. A smaller number of financial executives also were interviewed to obtain some perspectives on how top management perceives its company's DP facilities and expenditures.

In addition to finance and budget questions, the interview included questions dealing with operational plans and problems.

The DP expenditure items in the survey included an overall range of DP products and services. Expenditure changes were computed by averaging the responses and, using the Fortune 500 list bases, extrapolating to account for the entire industry.

In some industries where no real norm could be established or where the data seemed deficient, some judgment about the relative changes of individual budget items was applied.

A copy of the survey is available for $2,500 from Michael P. Burwen at Input, 2180 Sand Hill Road, Menlo Park, Calif. 94025.

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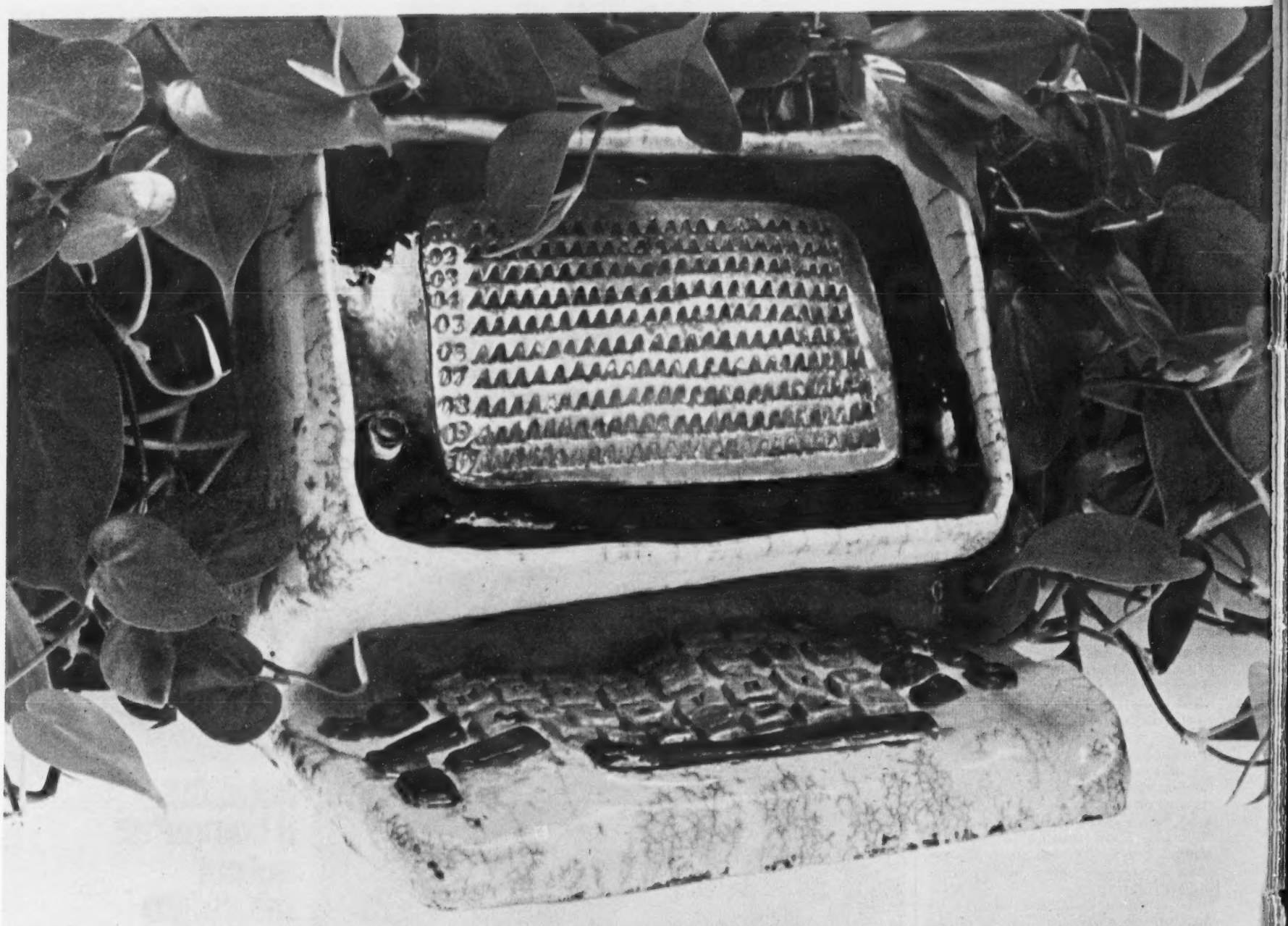

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Editorials

A Realistic Method

After two years of study, the National Commission on New Technological Uses of Copyrighted Works (Contu) appears to be on the verge of recommending copyright protection for computer programs and data bases [CW, March 14].

This is clearly the best direction to take and the commission is to be congratulated for making this stand in face of proponents of patenting for computer software or for some entirely new scheme to protect programs.

Copyrights, if treated seriously by the courts, can supply a fair measure of protection for computer programs, without stifling the dissemination of such programs as patent protection could.

In addition, copyrights are relatively easy and inexpensive to obtain, unlike patents which are difficult and expensive to get, at best.

Patents would only provide protection to those few programs that can claim to be both unique and nonobvious, while copyright protection will apply to a much larger body of software currently in use.

Other proposals for an entirely new registration system for computer software that is somewhere between copyrights and patents do have some merit. But they would set up a new bureaucracy and be more expensive to maintain than the current copyright system.

Proponents of both patenting and a new system should accept what now appears to be the inevitable — copyright protection, and only copyright protection, for computer software.

It is clear that copyrights may not be the "best" or "ideal" way to provide software protection. But at the same time, it is equally clear that copyrights are the most realistic, achievable method of providing that protection and should be supported for that reason.

All parties interested in the question — software producers and users alike — should now direct their efforts to finding ways to most successfully use the copyright system for software protection.

In Limbo

While the Federal Communications Commission revises its amendments to its proposed rules defining the boundary between computers and communications, Congress is rewriting the Communications Act of 1934.

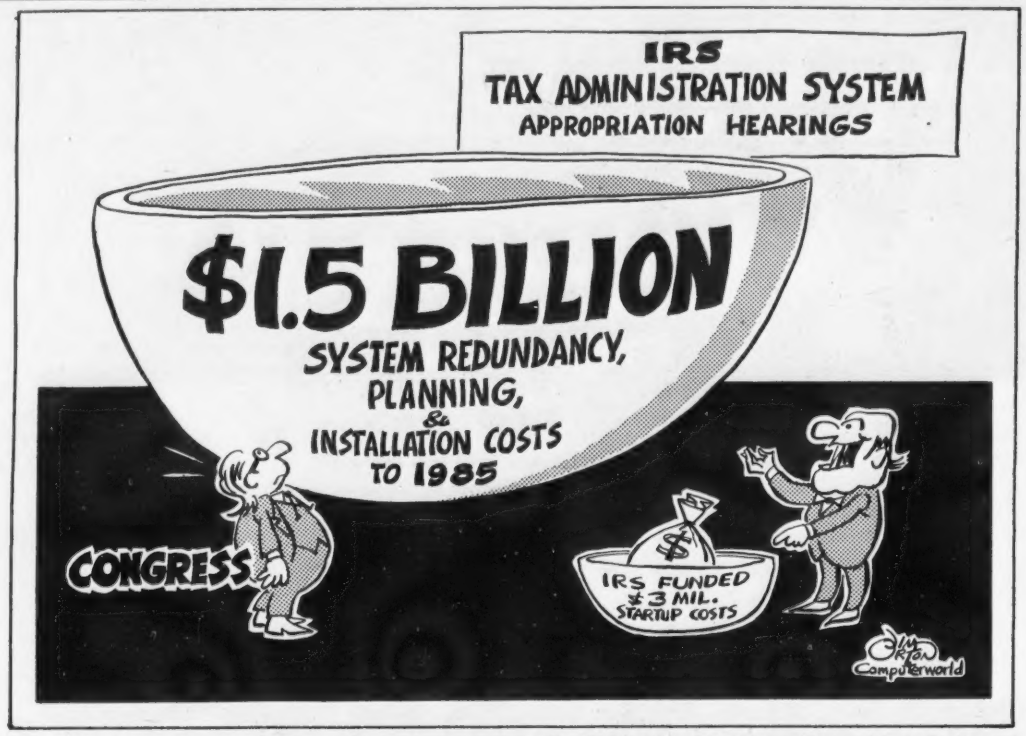
Meanwhile, little is being done to streamline the day-to-day regulatory environment. The major issues take too long to resolve and, when decisions are reached, the fast-moving area of telecommunications often has moved to another problem plateau.

It is somewhat silly to worry about an exact definition of computers and communications when there may be none. It is further absurd to try to assign certain roles and functions to specific types of terminals so they can be fitted into nice little slots.

There may be no boundary between computers and communications and it is unlikely that a congressional subcommittee would in any way lessen the bureaucratic machinery that now grinds on ever so slowly.

What users really need are some expedited decisions that will allow them to utilize their equipment and optimize their networks with a minimum of regulatory procedures.

That is the real message that users are transmitting to Washington. But the message is not getting through.



'To Minimize the Risk of Our Own Investment, We'll Need a Bit More From You Folks . '

Letters to the Editor

IRS Says TAS Plans Not Hidden, But Disclosed Since March 1974

The editorial titled "Taxing the System" [CW, Feb. 28] implied the Internal Revenue Service (IRS) was not fully disclosing its plans for a redesigned DP system and called for publication of a draft report by the Office of Technology Assessment (OTA) on the proposed redesign.

While we share your opinion regarding the importance of full disclosure of plans like ours, we are concerned about certain statements in your editorial.

Of primary concern is the implication that information on plans for the proposed Tax Administration System (TAS) has been withheld. In fact, the opposite is true.

Presentations of TAS plans within and outside of government have been extensive, beginning with an introduction to the system's concepts in March 1974 for approximately 100 persons in the DP community.

As system details developed, further discussions and formal presentations were given — the most recent in September 1976, with issuance of the 1,000-page TAS working document.

Representatives from 55 computer firms attended this briefing and 40 others, who were unable to attend, were sent the TAS material.

The Department of the Treasury and the Office of Management and Budget have also carefully considered the system's design from technical and budgetary standpoints.

The General Accounting Office (GAO) conducted thorough studies and issued two reports — one dealing with safeguarding taxpayer data, the other with costs and benefits. Although recommendations for improvements were made, GAO's overall conclusions supported the TAS effort by stating it was economically desirable and could provide a high level of protection to taxpayer data.

Over the past nine months, background material on the TAS plans, including the TAS working document, has been provided to appropriate congressional staffs.

A briefing was given to each house of Congress during last year's appropriations process, and another briefing is planned again early this spring.

Patrick J. Ruttle
Assistant Commissioner
Data Services

Internal Revenue Service
Washington, D.C.

People Come Before Machines

The following is in response to the editorial titled "Remember and Reassess" [CW, Feb. 14]:

While American Airlines has always considered machinery important to the operation of an airline, it has never thought the machine to be more important than the man or woman who operates it.

Beryl Simpson's viewpoint of Sabre, as expressed in Studs Terkel's book *Working* [CW, Feb. 14], is only one opinion and it does not fully represent the views of the airline's other reservations agents.

We're a people business and the individual comes first, whether it be the employee or the customer. In an increasingly competitive service industry, it is the individual who makes the difference.

This idea is perhaps better expressed by Daniel F. Murphy, vice-president of Passenger Services for the airline, who recently said: "We're a people business — people serving people — and, in the end, it's the human element, our own individual commitment to service that makes the biggest difference of all."

Kathleen Saluk
Public Relations Representative

American Airlines
New York, N.Y.

Data Past

Five Years Ago
March 22, 1972

BOSTON — The Federal District Court here was asked to rule that the Federal Bureau of Investigation's (FBI) maintenance and dissemination of incomplete or inaccurate criminal identification records violated the Constitution.

The suit was filed by Paul Cowan, who claimed he lost has job through false records contained in the FBI's data bank of criminal identifications.

— — —

DENVER — The 10th Circuit Court of Appeals here ruled that a company is responsible for the actions of its computer system and must live by those actions.

During the suit, State Farm Mutual Automobile Insurance Co. said it was not liable in the case of a fatal accident because the insurance policy had been cancelled although mistakenly renewed by the firm's computer system.

The judge ruled against this "DP error" defense, stating that errors and oversights of State Farm's human agents and employees were to blame.

Eight Years Ago
March 26, 1969

WASHINGTON, D.C. — The Association of Independent Software Companies declared that neither copyrights nor a proposed registration system would properly protect software inventions.

Under a registration system, as proposed by IBM, actual programs would be protected, but the concepts behind them would not be.

— — —

MINNEAPOLIS — One of the first installations of the $2/mo telephone data access interfaces was made here by Northwestern Bell. It was being used by Computer Terminals, Inc. to test various modems and terminals.

Distributed Processing No Exception

New Technologies Still Stymied by End-User Fears

By Jack Stone
Special to Computerworld

So now it is "distributed processing" that has the industry buzzing.

The young'uns see it as the onslaught of a dynamic new technology. But us oldsters — five or more years in the business — view it as a more intensive version of the traumatic fixation we suffered when we installed our last on-line, real-time, terminal-oriented, communicating, large-scale, centralized data base system (did I miss any of the buzzwords?).

Well, it may not seem so, but we — and I mean all of us — have come a long way over the years. Yet we — and again I mean all of us — have a long, long way to go.

To illustrate DPers' progress at installing complex systems, I interviewed Carole Crist, DP manager at the Springfield, Ohio, plant of Olan Mills, Inc., who is heading up a major part of her company's effort to move in the direction of distributed processing.

Olan Mills already has terminals feeding into minis at two of its plants and an IBM 370/145 in its corporate offices. The current plan is to put terminals in a nubmer at other locations.

Q. Carole, what has been your history in the wonderful world of data processing?

A. I started in 1965 in operations, moved into an operations supervisor slot and then into my current position as DP Manager. I am currently responsible for systems and programming, operations and technical training at this plant site, and I have an installation support responsibility at other locations.

Q. What is the nature of your company's business?

A. We are portrait photographers and operate a number of studios in major cities in the country. Administrative services are provided to groups of studies from district offices. Regional plants serve to process photographs.

Q. And what role does DP play in your company's operations?

A. Since our studios deal directly with the public, DP provides important support in handling the logistics of our business. Our major concerns are general administration, sales order processing and production (that is, photo processing) control.

Q. What has been the history of the development of your DP capability?

A. I think our experience has been comparable to that of many organizations. Our manual systems were converted to computer-based systems during the past five years. We have evolved from batch-oriented through terminal-oriented and to distributed processing systems which are now planned for implementation.

Q. Well, from what I have seen and learned about distributed processing, you and your company are certainly in for a roller-coaster installation experience.

There is no question the entire program will be extremely challenging, to say the least.

Q. I suppose configuring communicating networks with intelligent terminals and then making them all work properly is going to be a very tough problem.

A. Actually, the hardware configuration may be the least of our problems. We've built some in-house expertise over the years, as well as good relations with reliable vendors. Naturally, we will conduct appropriate tests on the hardware before making significant purchases.

The Human Connection

Q. I guess, then, that OS mods will occupy a lot of your programming talent, trying to customize vendor software to meet the unique needs of your organization.

A. We're fine in the OS department. Vendor software that we've seen looks quite comprehensive, reliable and properly supported.

Q. I assume the application development process has been a nightmare, trying to identify and meet the needs of a geographically dispersed user population.

A. Well, not really, no. You see, we in DP have come to know the company business rather well. We feel our designs will be effective and efficient for our user set since they represent reasonable evolutionary steps in the systems development process.

And, of course, pilot operations will uncover requirements for program modifications. Oh, we have not been without problems in the past, and we are certainly going to have programming problems in the future, but I feel that we have program development under control.

Q. Your project seems to have the technology well in hand. Is your management upset about cost overruns or schedule slippages or underutilization of hardware?

A. We are very fortunate with regard to management support. We in DP believe management has a reasonable understanding of what can be accomplished in a practical way and, therefore, it has been patient with our failures and laudatory of our successes.

Q. I'm afraid I'm a bit confused. You indicated earlier that the development is going to be very challenging, but I can't seem to find the big problem. You appear to have everything going right for you — hardware, software, applications, management. I would say your project is a piece of cake.

A. Did you ever try to train a production worker to correctly enter data into a computer terminal when that worker is afraid the terminal will eliminate his job?

Readers are invited to send inquiries and commentary on management and human relations in the DP setting to be answered in this column. Address letters to Stone, Suite 222, 2233 Wisconsin Ave. N.W., Washington, D.C. 20007.

'Golden Goose' Provisions

Contract Clauses Keep Site Up During Software Work

Unlike a factory which can be closed down by a strike for six months and then reopened with all of its value intact, a DP site cannot survive interruptions of service for long.

If files are not updated, input gathers and is not checked for accuracy while there is time to handle problems and cycle dates go unobserved, it is unlikely that things will go smoothly for a long time after the system is brought up again.

The Taylor Report
By
Alan Taylor, CDP

There are many ways a DP system can be brought down — the hardware can be unplugged, some of the software can be destroyed, the input can be polluted, for example.

Each particular situation has to be looked at separately, however. Previously in this column we have looked at the situation in the facilities management area. This week we'll take a look at what can reasonably be done to protect the DP operation in the software development area.

One way the potential user can protect himself is to write into the software development contract something known as "Golden Goose clauses." These clauses are essentially agreements that say that when there is a disagreement, the parties will not try to win their point by destroying whatever is being argued over.

Custom vs. Canned

A major sector of the DP community is engaged in developing software for others to use. Some of this software is custom software as opposed to canned software.

In custom software, the customer and the developer together work out specifications and delivery dates, sign a contract and then go on their merry way, each preparing for the day that the software will be brought into use.

The specifications will call out all sorts of things, such as "accurate computations," "capable of handling the workload within a normal business day," etc. The developer will expect the customer to change his way of working to accommodate the new software, produce appropriate input, have proper printed output forms available, train people in how to use the new output and see that an adequate staff is ready and able to handle the work involved while he and his experts prepare the software.

There are three basic situations which have to be guarded against in this situation:

- The software is not delivered.
- The software, when delivered, does not meet the customer's need.
- The software apparently meets the customer's need, but failures appear later.

Software Nondelivery

Software nondelivery rarely occurs completely, but more normally in some partial form. The customer starts to use the partially delivered software — and then the balance just doesn't arrive. The problem arises as to whether the customer can continue to use the software that has been delivered and to obtain the necessary maintenance for it from the developer.

Golden Goose clauses can protect the customer when data processing operations are clearly endangered. Typical Golden Goose clauses would provide for the right of the customer to use the software without accepting it by paying the developer an appropriate fee, perhaps even up to the full amount of the software contract.

This may appear to be unfair to the customer, but the developer has costs involved, too. Golden Goose clauses are designed to keep both parties cooperating so there is no way to expect their benefits to be one-sided.

Maintenance of the software is a ticklish area because the developer may simply not want to do it or may not be physically able to do it (staff loss, inadequate documentation, etc.). This is where the real nub of the problem lies.

In fact, maintenance of the software requires that the maintainer has access to more than the contract would normally provide to the user in the event of full software delivery.

This is the crucial area when considering software development contracts — how to get the developer to give up normally confidential material which has become essential to the continued operation of the customer's DP operation.

There are three major methods of doing this: Cash, confidentiality and benefit sharing. Cash is obvious. Confidentiality will probably mean disclosure of the software and other material supplied by the developer to the user will be restricted in some manner.

Benefit sharing, however, is unusual and arises from the nature of software. Take the case where access to the software designs has to be given to a second contractor to keep a piece of faulty software running. And then suppose he finds some error and corrects it. Now the customer is all right.

But the original contractor may also be able to benefit from this development. It may help him with future contracts or with other customers. The correct or different version of the software would not have been found except for his cooperation in giving access to the material — so why not give him the benefit of knowing what improvements have been made? It may help — and it can't hurt.

Golden-Goose clauses covering faulty software delivery are similar in nature to those covering delivery failure. They provide for continued availability of the software as delivered, for its maintenance and, if necessary, improvement on a shared-benefit basis, in much the same way as described earlier.

Software failures that are discovered some time after original delivery are a major problem, in the nature of both hardware and software. Neither hardware nor software stays the same, and often software is tested on hardware which does not permit the specified volumes of input files to be processed.

A possible approach to this area is the "time capsule approach." Copies of the documentation (perhaps on microfilm) are made at the time of delivery and, while not at that time made available to the customer, are available later if necessary.

The customer here obviously has to pay for the copying, but otherwise the situation is as in the software delivery failure case.

So there are some suggestions for Golden Goose clauses for the custom software areas. With failed delivery or immediately noted faulty delivery, customers have to use cash, confidentiality and shared benefits for their Golden Goose; latent failed specifications additionally need a time capsule provision. At least, these are my suggestions.

Yours may be different, and that is all right. What is not all right is failing to take into account the vulnerability of data processing and software at all and doing nothing to protect against the Golden Goose situation. That's sheer stupidity under the circumstances.

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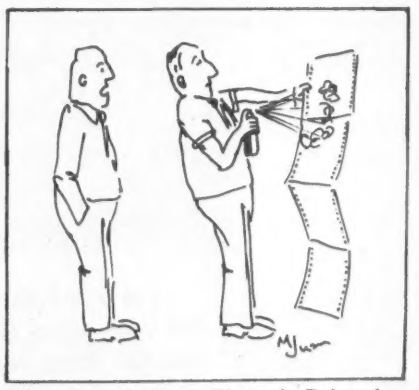


'You Haven't Been Through Debugging Training Yet, Have You?'

And Floppy vs. Flexible

Disc vs. Disk Controversy: One of Life's Small Wars

By J.D. Crawford
Special to Computerworld

The advent of the "diskette" not only revives one of life's small wars, but also promises to kindle a related, more vexing one.

The first involves the spelling of the name for a thin, flat, circular plate with a magnetic surface for storing information: disc vs. disk.

The second involves the term used to identify a particular type of such plate, specifically a non-rigid one: diskette vs. floppy disk vs. flexible disk.

Combining these spelling and term variations with the possible variations in capitalization and hyphenation can lead to confusion in user documents — unless we decide now which terms to use and how to spell them.

Evidently the Romans, in adapting the Greek alphabet for their use, created the K/C controversy. The root word is from the Greek *dikein,* to throw. From *dikein* came the Greek *diskos,* originally associated with the game of quoits.

The "k" in *diskos* is the Greek letter kappa and has the sound of our "k." The Greek form of kappa passed unchanged via the Etruscans to the Roman alphabet, in which it was rarely used.

Why? Because the Romans borrowed the Greek letter "gamma," changed its form to "c" and used it originally both for the sound "g" and "k."

Eventually they developed a graphic differentiation for the two sounds. They used the original form ("c") for the sound "k" and later also for other sounds such as "s" and "c" and developed a new modification for the sound "g."

Thus, Greek *diskos* became Latin *discus.* Since English borrows freely from both Greek and Latin, we often find ourselves in a K/C quandary. Sometimes we use them interchangeably, as in disc and disk. More often we're so indecisive that we play it safe and combine them, such as in pick, trick, lick and kick.

But disck? Not yet.

How have others resolved the disc/disk question? Well, from a layman's point of view, the whereas "disk" does not. Therefore, those in the computer industry would prefer "disc."

A random check of various technical sources somewhat bears out this inference. That is, computer-oriented magazines, glossaries, standards and dictionaries evidently prefer "disc"; more general technological sources, including computer-oriented companies, prefer "disk."

"Diskette" is formed by combining the word "disk" with the suffix "ette," which can have one of three denotations: imitation, as in "leatherette"; feminine, as in "usherette"; or small, as in "kitchenette."

Obviously, here the suffix indicates small. Thus "diskette," considering only its elements, means "small disk." (This formation, of course, eliminates the c vs. k controversy because c followed by e usually takes the s sound, resulting in, phonetically, "dis sette.)

To IBM, however, "diskette" is more than just a "small disk." "The diskette consists of a small flexible disk and a semirigid protective plastic jacket in which the disk is permanently enclosed," according to IBM's *Product Reference Literature.*

Diskette is not a registered trademark. Both IBM and Innovex, Inc. introduced diskettes at about the same time in 1970. I don't know who coined the term. Innovex had at one time applied for registration, but has since abandoned this effort.

In any event, if the term "diskette" is used, it need not be capitalized nor credited to a trademark holder.

Floppy vs. Flexible

Floppy and flexible are not synonymous. Floppy means tending to flop, loose and flexible. Flexible means capable of being bent of flexed — plus the old standby connotation, "responsive to change."

Although journalists (and engineers) use the term "floppy" freely (with both disc and disk) in technical articles, manufacturers of disks and disk drives avoid the term in their technical literature.

Apparently, manufacturers are apprehensive about associating their products with the root word "flop" and its many connotations — which range from "to fail utterly" to "the sound that a pasty substance makes when it hits the wall."

The choice between "floppy" and "flexible," then, is purely a matter of taste.

Crawford is with systems technical marketing communications at the Foxboro Co. in Foxboro, Mass.

Reader Commentary

American Heritage Dictionary defines "disc" as

disc. *n.* Also **disk. 1.** *Informal.* A phonograph record. 2. Variant of **disk.**

and "disk" as:

disk. *n.* Also **disc**. 1. Any thin, flat, circular plate. 2. Anything resembling such a plate, as an astronomical body or an anatomical structure. 3. *Botany* - - - - 4. Variant of **disc.**

Since variant spellings in this dictionary are introduced by the word "also," we can conclude the preferred spelling of the word for a phonograph record is "disc" and the preferred spelling of the word for any thin flat circular plate is "disk."

We might infer from this that "disc" (a phonograph record) connotes storage of information

Analysts Who Parrot Vendor Claims Risk Being Discredited if System Fails

By Charles J. Pekarek
Special to Computerworld

I am concerned with that facet of the systems analyst's function in which he serves as a buffer between hardware and/or software salesmen and in-house, non-DP management. This service is impeded by what I call the "internalization problem."

Simply put, the internalization problem is this: It is basic to the nature of DP that tasks which were once manually performed have been put on the computer and are more or less automatically performed.

Hardware/software vendors deal in capabilities: "Just look at what Whizmo 70 will do for you!" Systems analysts must counter with irritating questions about the nature and structure of the product: On the bottom line, what is Whizmo 70? How is it constructed?

Answers to such questions will allow the analyst to determine the product's utility, feasibility and adaptability.

The analyst who forgets where his paycheck comes from and turns into a simple extension of whatever salesperson who comes through his office door is asking for (and richly deserves) trouble.

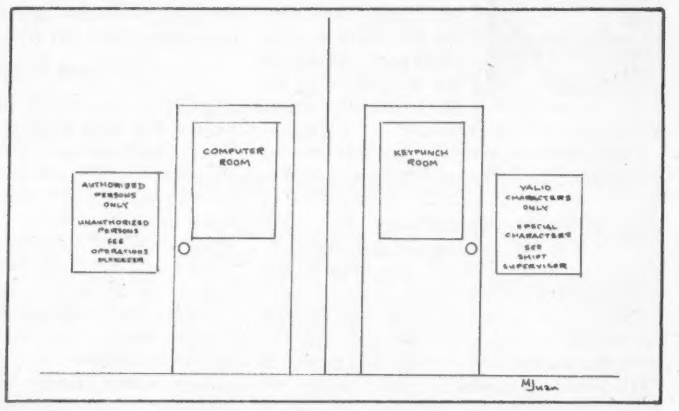
While this kind of parroting can be successful in the short run — non-DP managers can't call the bluff since they don't speak the language — when a new system proves to be a hopeless washout or when an old system is allowed to linger long past its utility, then it becomes clear to what degree the systems analyst has not been doing his job.

He will then be allowed to continue not doing his job, but without pay.

As the internalization process continues to relieve human beings of tedious, boring and repetitive tasks, it sets up the analyst as a cataloger of technology. There now exist a great many hardware/software combinations to do just about any job.

Some of these combinations aren't good for anybody. Some might be perfect for the company next door. Some might even be right for your company. The analyst must know how they do whatever they do before he knows whether he really wants them to do it.

Pekarek is with systems and planning at the J.E. Baker Co. in York, Pa.



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MISSISSIPPI STATE CENTRAL DATA PROCESSING AUTHORITY

Sealed proposals will be received by the CDPA, 508 Robert E. Lee Bldg., Jackson, MS 39201, up until 2:00 p.m. 4-11-77 for the following data processing equipment:

Request for Proposal No. 289 for the purchase of property insurance for state owned computer systems.

Request for Proposal No. 290 for the lease or purchase of a computer based process control system that will control the demand and consumption of electrical energy for the University of Southern Mississippi.

Detailed specifications may be obtained from the CDPA office. The CDPA reserves the right to reject any and all bids and proposals and to waive informalities.

Clyde P. Ballard, Executive Director
Central Data Processing Authority

INNOVATIONS FROM

Advertisement

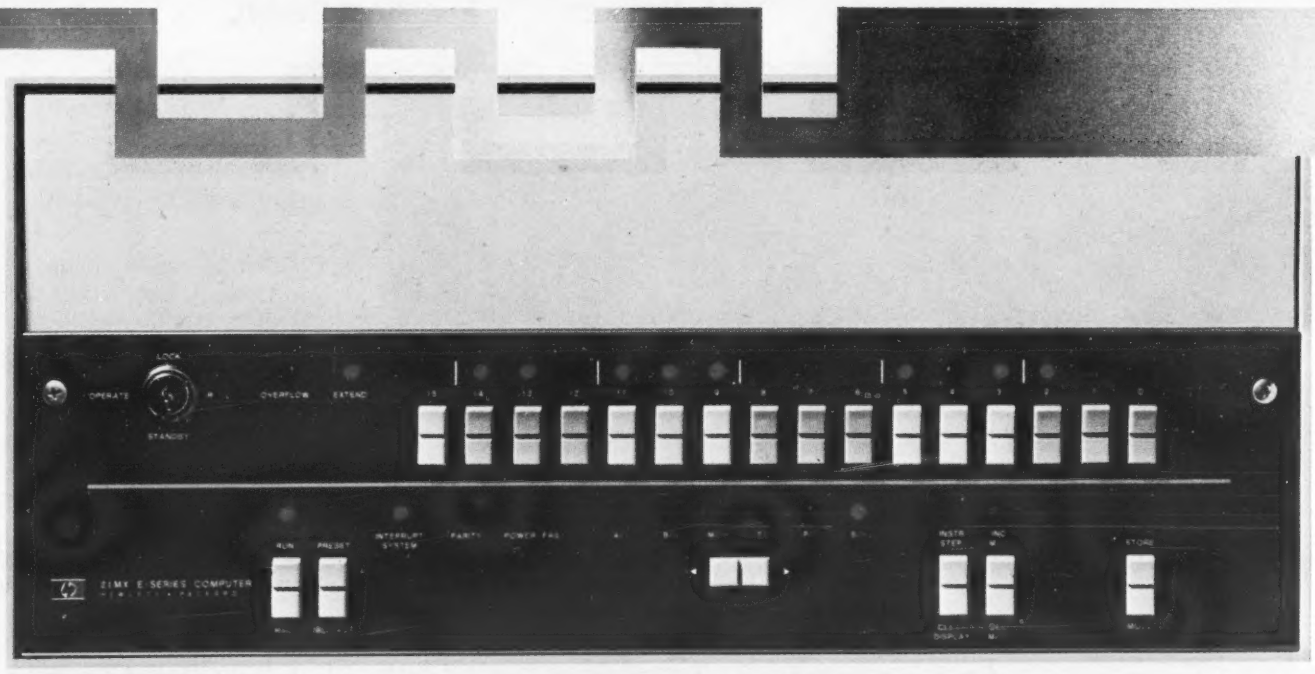
HEWLETT-PACKARD

COMPUTER ADVANCES

Customers demand the increased performance benefits of new technology without losing the software investment made through the years. Then, computer purchases are ongoing investments and not a series of capital losses. As the advances of technology are inevitable, the engineers at Hewlett-Packard believe in products capable of taking advantage of technology as it becomes available. This fundamental view plans for technology and not for obsolescence.

Since the introduction in 1971 of the first 21XX Series family member, the 2100, the infusion of new technologies has permitted the family to average a 30% yearly price decrease. By 1974 and the introduction of the 21MX, the family instruction set had been dramatically expanded to take advantage of the new technology of microprogramming. The price and reliability benefits of the new semiconductor memory were also made available. New peripherals were added.

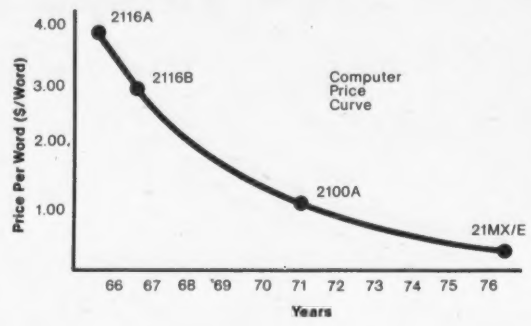
NEW VMT PROCESSOR INCREASES PERFORMANCE 70% TO 100%



for example those using the latest high-density disc technology. All the while, easy and compatible upgrade paths were available to HP's long-term, committed customers.

This history continues with the newest processor–the 21MX E-Series. The X-E is a more powerful implementation of the proven 21XX architecture. Through a combination of updated technologies and design innovations, the 21MX E-Series achieves a 70%-100% performance increase over the 21MX.

TECHNOLOGY DRIVES PRICES DOWN, DOWN, DOWN...



MODERN TECHNOLOGY

The E-Series takes full advantage of the latest developments in technology to provide maximum performance, yet maintains a high standard of reliability. The E-Series uses the latest MSI technology, Schottky TTL IC's, and fast 4K RAM memory to implement the 21XX family architecture. For performance, fast Schottky IC's are used on critical data paths; for reliability and economy, low-power Schottky IC's are used where speed is not critical. The result is a state-of-the-art implementation of the 21MX architecture that will allow systems to keep pace with requirements for many years.

DESIGN INNOVATIONS

Variable Microcycle Timing. The micro-instructions of a control processor do not all need the same amount of time to execute. Ignoring this, most microprogrammed computers simply define the micro-instruction execution time as that of the longest micro-instruction. This wastes time. A sign test operation on a register, for example, may require only 60% of the time it takes to output a control processor register to an I/O device interface.

An innovation from Hewlett-Packard, Variable Microcycle Timing (VMT) prevents this waste of time by adding instruction monitor and control logic. With this logic, the control processor's cycle time is dynamically altered to match the time required by the current micro-instruction.

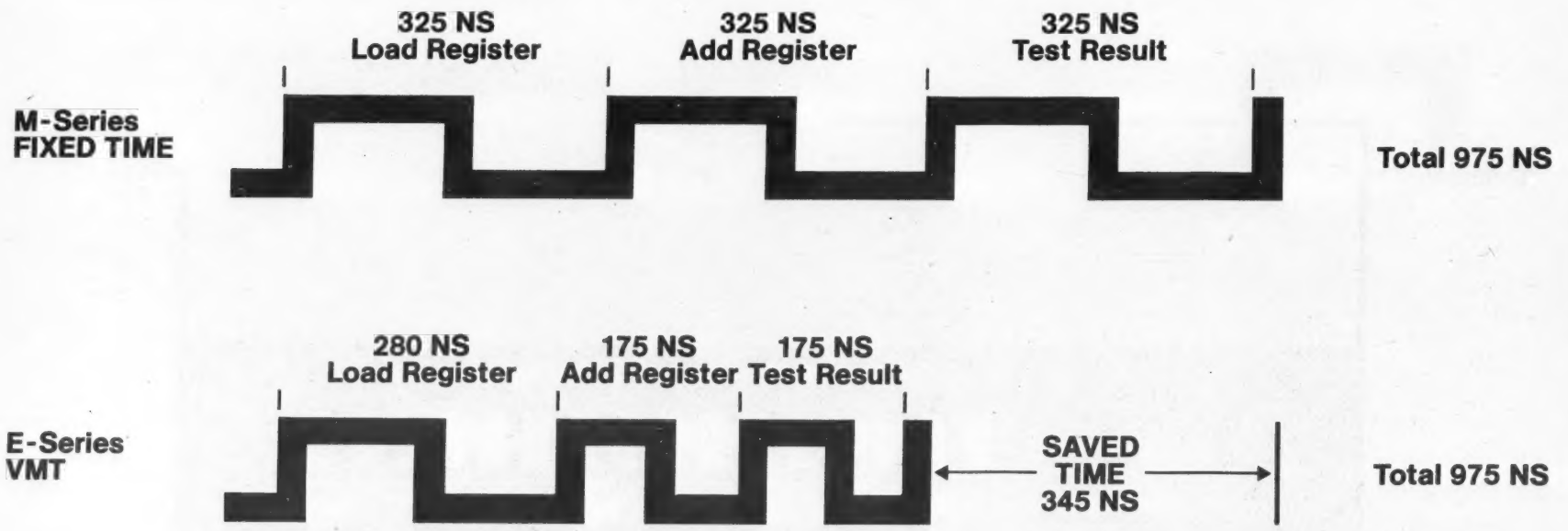
HP simplified VMT by dividing micro-instructions into two classes–those executing at less than 175NS and those executing at between 175NS and 280NS. Through a carefully optimized design, this innovative two-class VMT approach achieved an overall 30% increase in 21MX system performance–all at an insignificant increase in hardware cost.

Asynchronous Memory. Memory technology is changing at a tremendously rapid rate. Consequently, users want assurance that their computers will be able to take advantage of faster, larger, more reliable and less expensive memories as they become available.

In a microprogrammed computer, like the 21MX E-Series, using fully asynchronous interface with memory is an innovation that permits the use of new memory technology. An asynchronous system is flexible enough to interface with a wide variety of memory systems that take advantage of changing memory chip technology. The E-Series performance, then, will dramatically increase simply by changing memory boards.

In an asynchronous system, memory takes only the amount of time required to perform a read or write operation, then immediately informs the processor that it is available again as a system resource. Thus, the E-Series control processor can efficiently execute micro-instructions that do not use memory while memory, in parallel, is busy with a previous request. Asynchronous memory is a truly adaptive design that will allow the 21MX E-Series to continually take advantage of faster memory.

FIXED VS VARIABLE MICROCYCLE TIMING



Thanks to a technique known as VARIABLE MICROCYCLE TIMING and other innovations the 21MX E-Series provides up to 100% performance improvement over the earlier 21XX family members. VMT dynamically defines the micro-instruction execution times. This results in time savings on shorter executing operations.

INNOVATIONS IN USER MICROPROGRAMMING

Over 13,000 HP installations have user microprogrammable computers. All 21XX family members since the 2100 are microprogrammable. This flexible tool has been used by customers to increase the performance, security and flexibility of their systems. And HP has worked closely with users in an effort to acquaint them with this tool. As the result of this contact with our users, we have learned much to help us make the 21MX E-Series microprogrammability more powerful and easier to use.

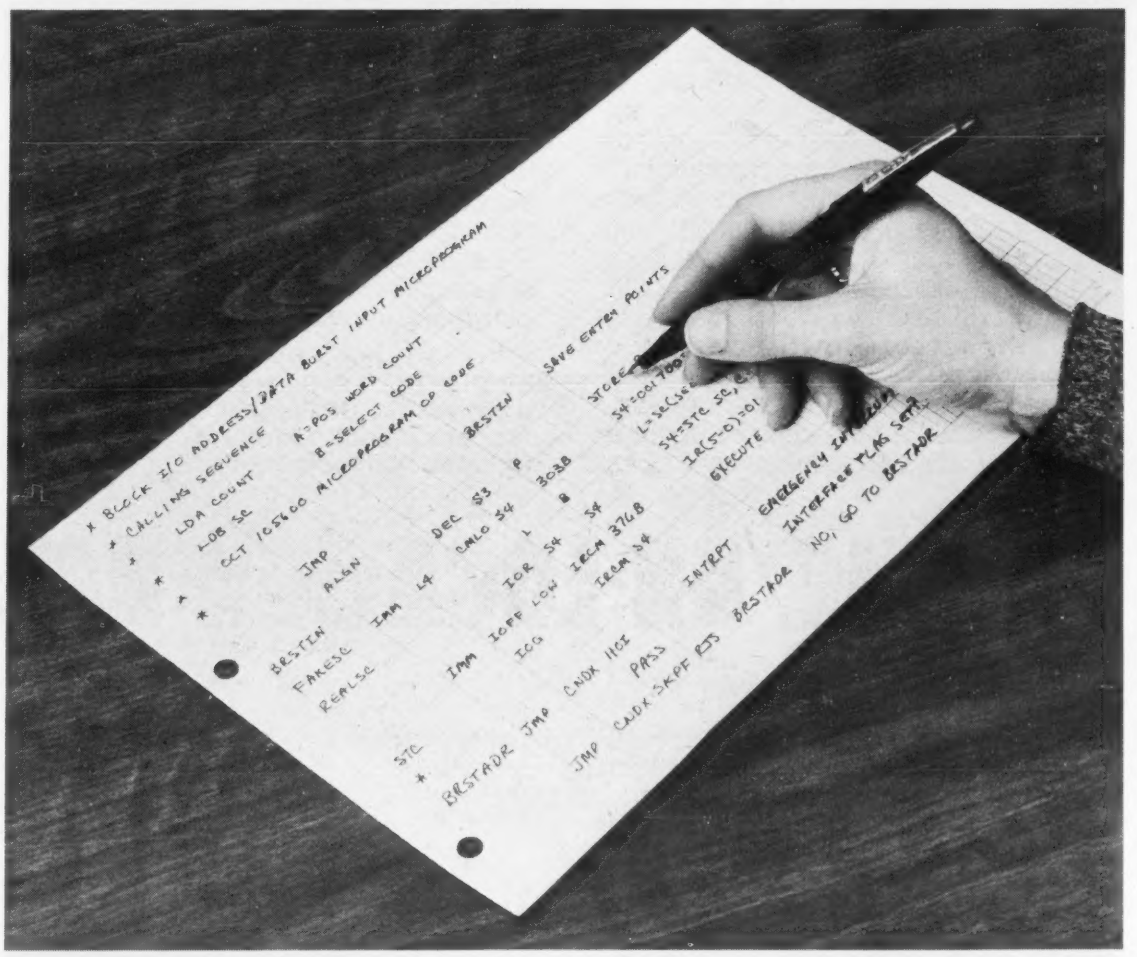
First is a basic increase of control processor address space to 16K words, of which 8.5K words are available for large user microprograms. This innovation speeds execution of subroutines by 3 to 20 times over standard assembly language implementations. Second, as the X-E supports multilevel stacked subroutine calls, it is possible to construct complex programs that use standard E-Series microprograms like floating point, memory management, integer arithmetic, and bit or byte manipulation routines. Third is a set of microprogramming software.

USER MICRO-PROGRAMMING SOFTWARE TOOLS

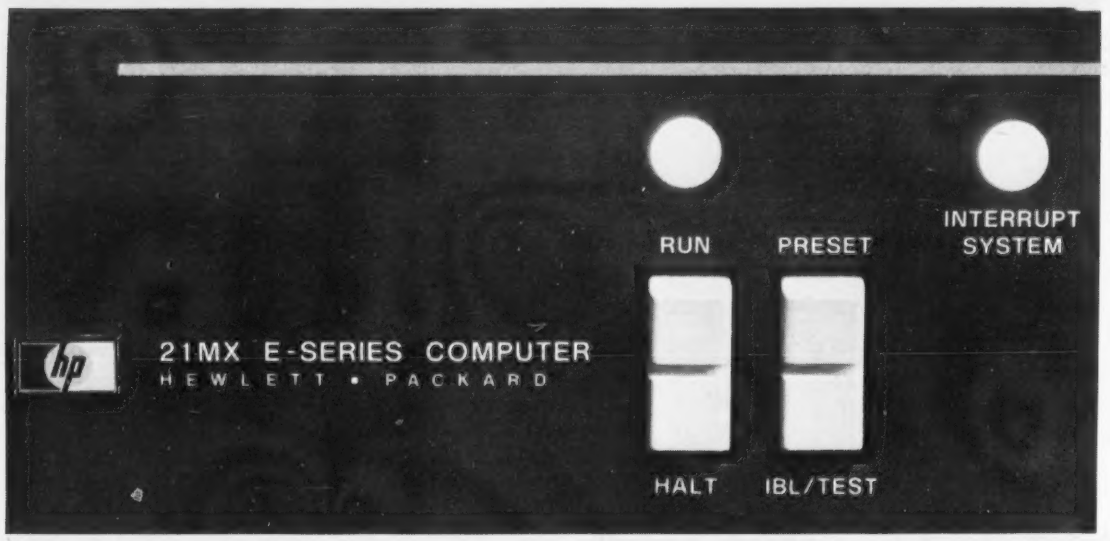
Making user microprogramming as simple as assembly language programming is the accomplishment of a new microprogramming support package that runs under HP's Real Time Executive (RTE) operating system. It provides a full symbolic assembler, a debug editor, and load utilities in conjunction with a new 1K word Writable Control Store (WCS). Now users can develop, assemble, edit, and test microprograms on line.

One of these utilities enables dynamic swapping of microprograms from main memory or a peripheral disc into Writable Control Store. A driver treats WCS as an allocatable system resource and resolves contentions between users. Control store can be used as a system resource to speed execution of critical, on-line routines. With this dynamic swapping of microcode in and out of control store, the user has unlimited microcode capability.

Microprograms may be stored and used in Writable Control Store or, through another utility program, may be stored on tapes for production of 1K or 4K bit PROMS. PROM-based programs may then be mounted on standard control store cards supplied by HP. Much like library routines, these microprograms may then be called from high level languages like Fortran, Basic, Algol, or Assembly Language and shared among all users of the system to speed program execution.



MICROPROGRAMMING–ON-LINE, OFF-LINE.
Interactive microprogramming makes microcoding simpler, more organized, and helps to retain records. The number of steps in writing a microprogram is reduced, as is the probability of error. Delays associated with batch processing are gone.



With the ease of a finger switch, a user can invoke a confidence check on 90% of the 21MX E-Series circuitry.

SELF TEST CHECKS HARDWARE AND SPEEDS REPAIR

Self test, a microprogrammed feature standard on all E-Series computers, performs a confidence check on 90% of the computer's circuitry either automatically on initial program load, or manually on demand from the front panel. In a matter of milliseconds, self-check diagnostics test the processor's data paths, registers, and memory. Self test can also be looped continuously to exercise computers at any stage of system integration.

Upon termination of a self test operation, the computer's front panel display either indicates a successful completion or notes problem areas, helping the user or HP's service engineers to isolate and repair faulty assemblies quickly.

SYSTEM GROWTH POWER

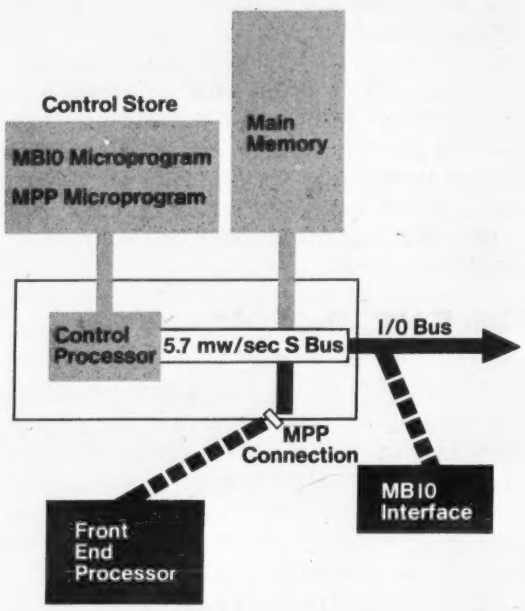
E-Series users have a computer whose power can be increased at will through microprogramming. Two innovative features, the Microprogrammable Block I/O (MBIO) and the Microprogrammable Processor Port (MPP), provide high speed data and control channels which, with microprograms, provide for both I/O and processor growth power. This means increased I/O throughput and processing efficiency.

I/O Growth Power. MBIO provides for greater I/O throughput than standard I/O methods. MBIO is an additional I/O channel capable of transferring blocks of data at rates of up to 3.1 million bytes per second or 50% faster than the normal DMA transfer rate. MBIO is controlled by a user-written microprogram that can be tailored to specific applications. The controlling microprogram can be short and simple for fast data transfers, or more intelligent for applications that require special character recognition, combined address/data transfer, byte packing, and so on.

Processor Growth Power. MPP also provides a means to greater system efficiency through microprogramming. But, unlike MBIO, MPP doesn't use the I/O structure of the E-Series; rather, it gives users a direct window to the 5.7 megaword-per-second main data bus of the E-Series. This direct connection allows extremely high speed data transfers. Front end or parallel processors, such as array processors, high speed A/D converters, arithmetic processors, high speed scanners and Fast Fourier Transform processors may be directly connected to the E-Series via the MPP. MPP is a whole new way of interfacing processors. Interaction between the E-Series and external processors occurs at very high speeds, and can be controlled as precisely as necessary with a user-written microprogram.

The 21MX E-Series is available in two models—the 2109A, at $5850, has up to five memory modules and nine I/O slots; and the 2113A, at $6850, has up to ten memory modules and fourteen I/O slots (U.S. domestic prices only). Discount schedules are available for OEMs. The E-Series has been in HP 1000 systems shipped since last November. Currently, deliveries are within eight weeks.

For more technical information on the 21MX E-Series, simply request a copy of the HP Journal, (circle A) or for further product information, circle B on the attached reply card.



21MX E-Series provide for both I/O and processor growth power with two innovations: the Microprogrammable Block I/O (MBIO) and the Microprogrammable Processor Port (MPP).

ON-LINE/ON-LOCATION DATA COLLECTION

A noted industry expert in manufacturing control, George W. Plossl, in his latest book, states that the last remaining frontier for profit gains is in tightening control of the manufacturing process.

Inventory investments can be reduced and greater production returns can result from wise operational decisions based on a detailed knowledge of the status and flow of production. Computers and information control systems are appropriate tools for achieving such careful and thorough monitoring. But such systems are only as valid as their data; thus the need for accurate and timely data collection.

The best approach to collecting such data is to capture it on-line, on-location, at its source. And one of the best systems for capturing this source data is a combination of the new Hewlett-Packard 3070 Real Time Applications Terminal and an HP 1000 system. The HP 3070 can be operated simply and easily by personnel who have no computer experience.

The HP 3070 recognizes two realities of the source data entry environment. First, more than likely, those people who are data sources have little, if any, computer sophistication or knowledge. Any device they use should be unimposing and easy to operate. Second, as the sources are usually scattered, the data entry terminals must be dispersed economically.

Gone is the hunt and peck method of searching for keys. The 3070 keyboard is simple, unassuming, and clearly marked. Specially prepared label paper can be custom lettered with recognizable calls and placed under protective plastic. Ten special function keys are software-interpreted so the user's single key stroke conveys an informative message. A set of fifteen tutorial prompting lights can be computer-controlled to guide the novice user's input sequence and to communi-

cate warnings or special requests. A numeric display is positioned to be visible over a wide viewing angle.

THE TAILORABLE HP 3070
The new HP 3070 Data Entry Terminal can be tailored for use in various aspects of manufacturing operations such as inventory status; cost accounting; production testing and reporting; order tracking and status; and maintenance reporting. Using convenient, quick-change paper inserts, the Special Function Keys and Prompting Lights may be custom labeled to suit a specific application. Connection to the HP 1000 via Serial Link Cable is a quick and simple plug/unplug. As each HP 3070 terminal is independent, location changes can be made without disrupting the network.

MULTI-DROP SAVINGS

The HP 3070 data collection network is based on a multi-drop concept. Unlike traditional systems where software accounts for all terminal handling, some of these tasks are accomplished by hardware, specifically by the HP computer interface card (controller board). Although this capability may vary with individual applications, the multi-drop concept allows as many as 56 HP 3070 terminals to be physically connected to a single, twisted-pair cable called a Serial Link Cable, which in turn connects to a single HP controller board in the HP 1000 system. The data entry network can extend as far as 4Km (2.4 miles), and terminals can be conveniently connected anywhere along the cable.

Cost savings resulting from a multi-drop approach are clear. One cable is used, not many. And the HP Serial Link Cable is not an expensive one to begin with. Cumbersome, costly cable installations are not necessary. One single board controls the entire network of HP 3070's and eliminates the expensive hardware common in traditional systems where each terminal must have its own controller interface.

MULTI-DROP FLEXIBILITY

In the flux of a manufacturing environment, it is important not to be restricted by an inflexible data collection system. And there must be potential for expandability and response to growth possibilities. Such flexibility is an integral part of an HP 3070 network, for each HP 3070 terminal is completely independent of the others. As the computer addresses and polls each terminal separately, neither the computer system nor the network is disturbed by an addition or location change of terminals. Terminals are connected and disconnected easily. Simply plug and unplug the HP 3070 from the Serial Link; the connection box is much like the phone jack in homes.

HP-IB COMPATIBILITY

Further expansion of a data entry network is possible since the HP 3070 includes the necessary commands and protocol to communicate with HP-IB* compatible devices. Thus, the HP 3070 can be used, not only for manual input of data, but also as a device to input data that is already in machine readable form. Data generated from an HP-IB instrument or instrument cluster can be entered into a system with an HP 3070.

"ERROR FREE" DATA TRANSMISSION

Assuring that data arrives error-free to the computer is especially critical in the electrically-noisy environments typical of most manufacturing operations. Aware of this fact, Hewlett-Packard has designed hardware for the HP 3070 which maximizes noise immunity and detects and corrects errors. It is extremely unusual to apply such thorough techniques to a data entry terminal, and the result is a dramatic reduction in the transmission of data errors.

HP uses a photo coupler device to electronically isolate the terminal and thus provide noise immunity from most disturbances. Further protection against transmission of errors is provided by hardware that automatically detects errors at the data receiving device—the controller board or the HP 3070 Terminal. By attaching five redundancy bits to each character being sent, a check is provided for the receiving device to ascertain whether the transmission was made accurately. If an error is detected, the system provides for an automatic data re-transmission. The extent of protection afforded is reassuring. Each character's transmission can recover 100% from up to six bits in error.

A SMART CONTROLLER BOARD

The controller board of the HP 3070 was designed to minimize the control that the CPU needs to exert for tasks like polling and management of the loop. It also avoids redundant capabilities in the terminals. Giving intelligence to the controller board reduces system overhead necessary to control the network. This efficiency is accomplished in several ways.

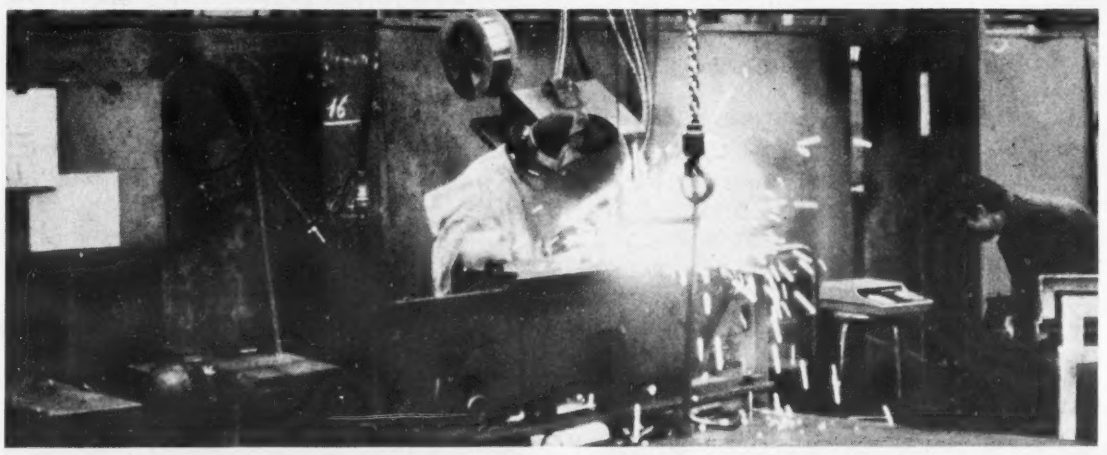
First, polling is restricted to the minimum number of terminals that need to be polled. Next, the effective data transmission speed dynamically varies. It is automatically and optimally determined, not by the total number of terminals on the data collection system, as is traditionally done, but by the number requested by the software at the time. This time savings is substantial, for rarely do all terminals transmit simultaneously.

Finally, the controller board has a "memory;" it polls and buffers each terminal before sending the block of data to the computer for processing. This minimizes CPU interruption and reduces system overhead. With this innovation, data transfers can be made more efficiently.

The HP 3070 Data Entry Terminal is priced at $1470 (U.S. domestic prices only). OEM and end user quality discount schedules are available.

*HP-IB (Hewlett-Packard Interface Bus) is Hewlett-Packard's implementation of the IEEE Standard 488-1975 "Digital Interface for Programmable Instrumentation."

If you are interested in receiving more information about the HP 3070, or the HP 1000 computer, circle C on the attached reply card.



"ERROR FREE" TRANSMISSION

In a manufacturing plant near Grenoble, France, we installed 2Km (1.4 miles) of Serial Link Cable, to connect a 21MX based computer system to the new HP 3070 Data Entry Terminal. To create an electrically disturbed environment, the cable was wrapped around the power lines of numerous massive welding machines.

A continuous flow of data was transmitted to and from the HP 3070 terminal and was monitored by an HP computer. Even under these extreme conditions, no errors were received during this intensive eight-hour field trial. "Error-free" transmission is an HP 3070 innovation.

USER TESTED PERFORMANCE

Standard Oil of California provides next day shipment to customers. The computerized corner drugstore relieves 90% of behind-counter clerical workload.

Standard Oil Company of California's computing resources now are available to their service stations and direct buying customers as they place phone orders for the company's products as a result of a recently launched distributed processing network.

SOCAL's Southwest area customers now can receive next-day shipment from the company's inventory of approximately 3,000 packaged petroleum and TBA (tire, battery and accessory) products.

In addition to providing the company's order entry personnel with online video display terminals, the multifunctional network controls a host of other operations: inventory adjustment, warehouse control, manpower projections and fill line scheduling.

Making this possible are two remote Hewlett-Packard minicomputers, the first of a national network of up to 18 planned distributed processors, initially running at two of the company's Southern California distribution points: its Los Angeles TBA warehouse and its El Segundo package petroleum warehouse.

The online, real time model HP 21MX minicomputers will be controlled by a HP 21MX central mini, which in turn will transmit confirmed orders and inventory data to a System 370/168.

The network, designed to enhance customer service was developed jointly by SOCAL and its systems contractor, MST (Management Systems Technology) of Chicago.

A Chevron dealer can place one phone order through the Los Angeles TBA warehouse for any of 1,200 TBA items and package petroleum products sold at service stations. The order can be delivered in one shipment within 24 hours.

Order entry personnel may access account files by customer name, service station number or account number. Displays alert them to special promotions and quantity price breaks. Products are accessed by either codes or a specially designed alpha technique that allows the same product to be identified by different input keys.

The computerized corner drugstore...

Computerized pharmacy is no longer a prediction. It is a reality. Management Systems Technology of Chicago installed its first Script Control™ dispensing system last fall at the Midwest's largest drug wholesaler.

Eight separate steps involved in dispensing drugs manually are reduced to a simple one step entry. As a result, approximately 90% of the pharmacists' behind-counter clerical workload is eliminated and up to 80 prescriptions per hour can be filled.

A Hewlett-Packard 21MX based Minicomputer System maintains a central data base accessable 24 hours daily and controls remote video displays and hard copy printers at subscribing pharmacies that will number 400 by the end of this year.

One of the HP 21MX Minicomputers with 64-K bytes of memory, together with varied HP peripherals, located at the central wholesaler site, can accommodate 16 pharmacies. Proprietary MST software was designed by pharmacists with pharmacists in mind. Druggists can interact with a Script Control system simply and with no previous computer knowledge.

For example, instantly after entering prescription number and drug identification, Script Control, in one step, accomplishes the following: prices the prescription; maintains the patient's profile; checks for drug interactions and allergic reactions; prints the label, receipt, alert messages and refill sticker; and prepares all tapes and documents for third party and state billing.

Savings derived from the use of Script Control are real and directly improve the profit picture for the pharmacist. Average third party rejection rate has been reduced to less than 1%. Headaches associated with constant price changes of pharmaceuticals are eliminated. Script Control uses the latest price and in addition lists generically equal drugs that when appropriate can be substituted at a cost savings to the patient.

The 22 functions of Script Control are under the complete control of the pharmacists. Changing from activity to activity is done simply by entering 3 keystrokes.

Byproducts of Script Control automatically filter into pharmacy record keeping and gives the pharmacist a new level of management control that was previously unattainable. Gross profit analysis, item movement and labor scheduling reports are three such examples.

Several years ago, MST also using HP computers, developed a predecessor system, CPS,™ (Consulting Pharmacy System). Used by pharmacists who specialize in serving skilled nursing centers, CPS presently is processing more prescriptions than any other available computerized system.

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By Salvaging 'Superfluous Americans'

DPers Can Bridge Job Displacement Gap They Create

By Lewis A. Lardaro
Special to Computerworld

A recent university seminar concerning the displacement of individuals from the ranks of the employed to that of the unemployed seemed to profess that the DP industry is a prime contributor to the dramatic increases in the unemployment rate. The contention was that advances in technological growth diminish the need for the manual or blue-collar worker and result in the escalating of unemployment figures.

Surely some of the onus rests with the DP industry since, through our system endeavors, the displacement gap widens at an ever-accelerating rate. This is manifested quite clearly when one considers that new systems are cost-justified from, among other things, staff reductions.

Further, our systems' efforts demand better educated and well-trained individuals to respond to our poorly developed instructions and esoteric messages.

Andrew Hacker, in *The End Of An American Era* (Atheneum, New York, 1971), supports this thesis by stating that two distinct groups of Americans are emerging. One group can be described as "Corporate Americans" and the other group as "Superfluous Americans."

"Corporate Americans" are those individuals protected by the corporate umbrella; "Superfluous Americans" are the unemployed, ill-trained human beings displaced by contemporary technology.

Affirmative Action programs give us a unique opportunity to rectify some of the injustices. Skills inventory systems must be developed or expanded to include an accurate account of all employees because blue-collar workers could provide a wealth of potential candidates for careers in data processing.

The shift in programming languages, from the ancient machine languages to the current high-level, English-like, query-type language of today, reduces the mathematical, engineering and scientific requirements formally demanded of entry-level programmers. This affords DP departments more leverage in hiring programming personnel and provides an excellent opportunity for bridging the displacement gap.

Hacker believes, and rightfully so, that technological advances have created the hiatus and that technological advances must be used as the counterveiling force in ebbing its progress. Evidences of the foregoing are already prevalent in today's society.

Computer technology and data communications are being used as tutorial aides in the hope of improving the educational level of society. Computer-assisted skills inventory and personnel systems are being used to maintain and track an individual's educational and skills profile. The DP industry must continue to look for new horizons in narrowing the displacement gap so equilibrium and harmony are maintained in Corporate America.

While not all displaced individuals are potential candidates for careers in data processing, recruiting practices should include a search of a department or section that is the subject of a data processing project. The key is not to limit our search to those threatened individuals, but to concentrate on the entire department for candidates.

Any individual, whether threatened or not, who is salvaged from a jeopardized department will have a positive effect on the displacement gap. Thus, technology can yield greater reward for all areas and a positive affect in reducing the number of "Superfluous Americans."

Lardaro is manager of computer applications in the Telecommunications Systems Development sector at American Express Co., New York.

Reader Commentary

Letter to the Editor

Technical Writers Need Own Corporate Organization

In his fine article on technical writing ["Tech Writers Need More Than Knowledge About DP," CW, Feb. 14], Don Johnson indicated technical writers must combine several elements of art and technology in order to produce the best and most useful end product. I couldn't agree more.

But he also touched on a significant problem that plagues all of us who are involved in the creation of technical documents. All too often, the role of the technical writer is minimized by technical managers and their staff. Because programmers, analysts and engineers often have tight schedules, they are reluctant to take time to work with a technical writer.

That's understandable to a point. But it is important to remember that good documentation plays a significant role in user acceptance of the end product. Inadequate or poorly conceived documentation can substantially impair the marketability of any technical product, no matter how good the product may be.

Upper management can and should play an active role in ensuring that product documentation receives the attention it deserves. One of the best ways to accomplish this is to move tech writers and other documentation production personnel out from under the direct control of technical managers.

Technical writers should be organized under a manager whose only concern is the creation of documentation. The resulting publications group should be given corporate stature, if possible, so it can properly execute its responsibilities and ensure uniform applications of corporate publications standards to all company documentation.

Lee E. Hendrickson
Los Angeles, Calif.

How to get your own free ticket to COMPUTER EXPO 77

1. **Circle the job title that most nearly describes your responsibilities:**
President, Executive Vice President, Vice President–Operations, Director of Data Processing, Data Processing Manager, DP Operations Director, Administrative Manager, Senior Systems Analyst, Senior Programmer, Engineering Management, Engineering Staff, Financial Officers, Operating Department Heads.

2. **Circle the city and dates most convenient to you:**
San Francisco Civic Auditorium—March 29–31
Los Angeles Convention Center—April 5–7
Cleveland Convention Center—April 19–21
Minneapolis/St. Paul, St. Paul Civic Center —April 26–28
Chicago, McCormick Place—May 3–5
New York Coliseum—May 10–12
Philadelphia Civic Center—May 24–26
Washington, DC, Sheraton Park Hotel —May 31– June 2
Boston, Northeast Trade Center (Rte 128, exit 39) —June 7–9

3. **Circle those dates on your business calendar.**
Then show up and register! As a qualified professional, that's all you need to do to take part in the varied exhibits, demonstrations and exhibitor seminars.

SEE: *Live Demonstrations and Displays* of new computer products and services, including Communications Terminals, Software, Minicomputers, Data Input Equipment, Computer Output Equipment, Supplies, Magnetic Media, Modems, DP Education, Small Business Computer Systems, Flexible Disk Drives, Data Communications Interconnect Equipment, Miniperipherals, Magnetic Tape Transports, Cassette Systems, Power Supplies, Printer Terminals, Keyboards . . . and more! Every day from 10 AM to 5 PM.

VISIT: *Free Exhibitor Seminars* covering the selection and use of these products and services. These free seminars will be held every day.

ENROLL: *Case Study User Forums** will be conducted in all nine cities by leading users and independent consultants. Topics are: Applying Minicomputers (Tuesday) • Managing Terminal Networks (Wednesday) • Improving Software Productivity (Thursday)

NOTE: *Computer Designer Forums** will also be available in San Francisco, Los Angeles, Chicago, New York and Boston. Topics include: Evaluating and Using Microprocessors • Evaluating Peripherals for Mini- and Microcomputers • Evaluating Memory and Storage Devices

*The Forums are held in conjunction with COMPUTER EXPO and require separate registration and fees. They are held each day from 9 AM to 1 PM. One day's admission fee is only $45; additional days are $35. Advance registration is recommended. Call (800) 225-3080 to reserve your space and get complete registration materials.

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Programming Language Often Only a Status Symbol

By Miles Benson
Special to Computerworld

Have you ever thought of a programming language as a status symbol?

I mean, suppose your shop had its own language, used nowhere else, tailored to your application and solutions. Whatever else it might be to you, it would probably be a status symbol as well.

The Sociology of Computing

Picture the conversations at computing conferences:

"Why no, we don't use Cobol for business applications. Ourownia is the language we use. It was designed and implemented in-house, and our programmers love it."

"Fortran? I'd almost forgotten it existed. No, we use Ourownia. It has a special set of built-in engineering functions tailored to our company's business."

"We gave up Assembly language years ago. When we designed Ourownia, we included system-specific features to optimize use of our hardware."

Far-fetched? Nonstandard? Counterproductive? Probably.

But it has happened. Right here, in the good old U.S. of A. And this is the story of one such language. For the sake of disguise, let's just go on calling it Ourownia.

When I first ran into Ourownia, I was working on a proposal for a government contract, and one of the tasks was the selection of a programming language to use to code the applications. Since we at Softpro Software intended to use our own Marketronics 3-PI computer to implement the system, we naturally figured that PL/PI was the language to use.

But the government agency to whom we were sending the proposal asked us to evaluate Ourownia as well. Seemed a little odd at the time, but then programming languages have proliferated like oversexed rabbits over the years, and I wouldn't have been too surprised if they'd asked us to evaluate Eiffeltoweral.

Matrix Technique

I like to use a matrix technique for evaluating languages. Nothing fancy — just a way of laying out the results so they're easy to compare. Across the top I list the languages. Down the side I list the features each has. In the matrix I say a few concise words about whether each language has the feature and how well. The look of objectivity, with a heavy overlay of subjectivity. But it does the job.

For this evaluation, I stuck to just PL/PI and Ourownia. We already knew PL/PI would do the job, and we were really just scoring Ourownia because we'd been asked to. But I *was* curious — language nuts like me do like to stay on top of the new ones when they come along.

And besides, it really did seem a little suspicious that the government agency had invented a new language. I always did enjoy unravelling mystery stories.

When the Ourownia documentation came, I got my first shock. It was a clumsy looking language, with long and not very informative keywords, odd punctuation and some fairly onerous user standards.

Otherwise, it had a vaguely familiar ring to it. But then all programming languages tend to look alike with a bag over their syntax.

I whipped out my matrix form and began reading for score. The language began to look better as I got down to details. It had all the traditional basic constructs — assignments, loops, comparisons, procedures and several forms of the ever-popular GOTO. Its IFs had THENs and ELSEs. Its loops had WHILEs and UNTILs. Its GOTOs even had CASEs.

Looking Better and Better

I was beginning to like it better and better. And when I discovered it had BEGIN-END blocks and a reasonable treatment of nested scopes, I almost got excited.

But that wasn't all. The data declarations were a joy. Besides all the predictables, like floating and integer and even scaled fixed-point and decimal, there was a data structure treatment that allowed for both arrays and nonhomogeneous data aggregates. Bit strings and byte strings, independent of word boundaries, were there in all their glory.

It was a good, complete, modern language, with a lot of good, solid pragmatics and a dash of theory. Maybe the government agency wasn't as parochial as I thought.

At this point in time, the PL/PI column in the matrix was still empty. I knew the language pretty well, but I still needed to make a pass through the documentation to make sure I was accurate.

PL/PI is a good, rich, modern language, too cumbersome for its own good but at least powerful enough to do the job. I've seen better languages, or at least languages that looked better at first glance, but inevitably some small but vital feature has been omitted for ease of implementation or out of laziness or ignorance, and its absence rears up and bites you when you need it most.

Rapid Scoring

The scoring of PL/PI went rapidly. A couple of hours after I started, the matrix column was half complete. It was then that I began to notice it. There was an amazing similarity between the two columns in the matrix. PL/PI's entries read like a duplicate of Ourownia's. I began wondering about it.

I wondered more as the scoring progressed. I wondered most of all when I finished. Ourownia, the scores showed, was a functional carbon copy of PL/PI. Oh, the carbon was smudged a little. The government agency had added a few bells and whistles, like debugging capability. But basically, the languages were identical. Except for syntax.

I mulled that one over for a while. And the message began coming through. Someone had deliberately defined a carbon copy language, tacked on a few extras and then distorted the syntax to hide the crime.

If you only had a casual knowledge of computing, you'd never know what happened. The languages didn't look at all alike. Installation managers, or high-ranking officers or Senate investigating committees would never see the sameness. Only the grunts who used Ourownia might catch on. And why would they care?

Which brings us back to why, in fact, anyone would care to perpetrate this perverse level of white-collar computer crime in the first place. The only possible answer lies in the first sentence of this story:

Have you ever thought of a programming language as a status symbol?

Well, whoever authorized and/or authored Ourownia sure did. It was its only reason for existence.

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In Modular Packages

Altair 8800 Micro Users Get Business Applications

ATLANTA — The interests of the business-oriented DP user are beginning to be recognized by the microcomputer vendors; the Altair Software Distribution Co. (ASDC) has announced the Altair Business System software for use on the Altair 8800.

The software includes packages for accounting, word processing and inventory control. The accounting system includes four modular packages which can be used by themselves or as parts of an integrated whole, ASDC said.

Of the subsystems, the general ledger routines are available now, while the payroll, receivables and payables packages are still in development, but are expected to be available for delivery by the end of the second quarter.

The ledger system generates monthly balance sheets and income statements. The payroll system will handle both salaried and hourly personnel for both periodic payments and reports for government agencies. The receivables package will handle invoicing and monthly statements of customers, while the payables routines keep track of current and aged vendor accounts.

The word processing package is described as a flexible text editor system that allows large-volume text material — such as contracts or other lengthy documents — to be stored, updated and prepared for printing.

The system is capable of supporting both simple in-line corrections and global editing functions, a spokesman added.

A single document under the word processing system may contain 120,000 characters or about 35 single-spaced pages, and documents may be linked for longer text.

The inventory management package was designed to allow a user to construct the fields of an inventory file and to maintain them on-line. In its off-the-shelf form, available now, the package is structured for a typical retail store whose inventory policy is based on minimum reorder points.

The Altair 8800 hardware, on which these systems run, may be individually configured for each installation. However, in addition to the CPU, it typically includes 48K bytes of memory (20K of which is used by the operating system), a CRT terminal, a "typewriter-quality precision printer" and one or more floppy diskettes, the company noted.

Written in Altair's disk Basic, the software packages range in cost from $5,000 for the full accounting system to $2,000 each for the word processing and inventory runs.

They are distributed through 26 Altair computer centers throughout the U.S., but inquiries can be addressed to ASDC at Suite 343, 3330 Peachtree Road N.E., Atlanta, Ga. 30326.

'APO' Restructures OS/VS1 Programs

SUNNYVALE, Calif. — The Automatic Program Optimizer (APO) now enables IBM OS/VS1 users to increase throughput and reduce overhead through measurement and restructuring of programs without operator intervention, according to the vendor, Boole & Babbage, Inc.

APO was introduced some time ago and is still available for OS/VS2 sites, a spokesman noted. However, VS1 users were often the ones who really needed the capabilites of the package more than did the VS2 installations, the spokesman added.

VS1 systems are generally being used to near capacity; as a result, any backup of work caused by poor throughput or a bad run throws off their scheduling efforts, he said.

APO was designed to reduce paging overhead, increase throughput and shorten batch turnaround time, the company noted.

Working independently of the operations staff, APO avoids language dependence, special measurement runs and recompilations. It measures programs in a production environment, the spokesman said.

The software helps users determine which programs will benefit most from optimization, develops inter-CSECT reference data, determines the optimal ordering of the module's CSECTs and creates a new, restructured load module ready for execution.

The use of APO is not limited to use with any specific program and has been used to optimize both proprietary and user-developed programs. Users have reported improvements of up to 91% in their paging rates, the spokesman claimed.

Another user recorded an improvement of 20% in working sets resulting in a 25% improvement in throughput, he added.

APO costs $12,000, but a 20% discount is available through April 30, the spokesman said from company headquarters at 850 Stewart Dr., Sunnyvale, Calif. 94086.

'TUG' Eases Test Data Generation

MINNEAPOLIS — The Technalysis Utility Generator (TUG) was described by its developer — Technalysis Corp. — as "a functional and fresh approach to test data generation" for IBM 360/370 environments.

Ease of use was said to be the primary concern in the product's design.

Although substantial volumes of data can be generated, the developers argued that a limited amount of exactly controlled data is a better, more-effective test of a program than are massive amounts of live data or samples from it.

Tugims, an extension of the original package, provides for initial loading of physical and logical data bases and support for insert, replace, delete and dump functions in existing data bases under IBM's Information Management System.

Data Base Support

Logical data base relationships are "easily handled" through use of Tugims, the vendor claimed.

The package allows up to 40 records (400 segments in Tugims) to be allocated and defined. Data manipulation commands allow field modification as records or segments are output, the spokesman added.

Record definitions are language independent and are usually stored on disk files, which allows systems analysts and users to participate fully in the testing cycle, he said.

Licenses for TUG are available for $4,000; the Tugims option costs another $2,000, the spokesman said from 4640 W. 77th St., Minneapolis, Minn. 55435.

'CICS Dump Analyzer' Enhanced

NEW YORK — The Interactive Transaction Dump Facility (ITDF) was designed by Commercial Software, Inc. as an enhancement to the company's CICS Dump Analyzer in support of users of IBM's Customer Information Control System (CICS), according to a spokesman.

ITDF can be activated from any IBM 3270 terminal in the user's CICS network and the activation can be limited to specific transaction and terminal combinations, he said.

Once activated, the software will intercept calls to the Dump Control Program, record the requesting transaction and call the Dump Control Program to provide the normal hard-copy dump, but store it on disk.

Dump Storage

ITDF allows the user to select the maximum number of dumps to be retained in temporary storage, to selectively purge dumps — presumably after they have been analyzed — or to request that particular dumps not be purged.

ITDF maintains a directory of currently stored dumps and their status, which may be displayed at a 3270 terminal. Each entry is given a unique number and access to any stored dump is by that number.

Commands permit paging through the dump or through a control structure.

The CICS Dump Analyzer, including ITDF, costs $165/mo for OS sites or $175/mo for OS/VS and DOS/VS installations.

The firm is at 420 Lexington Ave., New York, N.Y. 10017.

Guide Compares Software

PHILADELPHIA — The *Vendor Matrix* was developed by Hay Associates to help installations in sifting through the maze of personnel and payroll software on the market and in sorting out sales claims from technical specifications, according to a spokesman.

The guide is not set up to suggest ratings for various aspects of the different products covered, he stressed. It simply gives a side-by-side comparison of the offerings of 15 personnel/payroll system vendors, with as many as 150 pieces of information on each, he said.

The *Vendor Matrix* is available as a stand-alone product for $300 or as part of a day of consulting provided by Hay for $500, the firm said from 1845 Walnut St., Philadelphia, Pa. 19103.

Package for PDP-11 Releases Disk Space

BEDFORD, Mass. — Delobj — a program for Digital Equipment Corp. PDP-11s running under RT-11— frees disk space by deleting object files which have corresponding source programs on file, according to a spokesman for the Bedford Group, the package vendor.

The software scans a specified device on which program libraries reside. If it finds a Fortran or Macro source program as well as an object-level version of the same program, it drops the object code and releases the disk space for other uses.

The firm can be reached through P.O. Box 352, Bedford, Mass. 01732.

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Codasyl Asking Project Help

MONROEVILLE, Pa. — The Executive Committee of the Conference on Data Systems Languages (Codasyl) has approved the organization of two new standing committees and is seeking people and institutions to work on them.

The End User Facilities (EUF) Committee will develop specifications for "facilities which will allow noncomputer personnel to interact with the computer and its resident data base in a manner natural to such users," according to committee chairman Henry C. Lefkovits, an independent consultant from Harvard, Mass.

The Common Operating System Control Language (COSCL) Committee is being organized to determine what possibilities exist for a job control language that is common to a number of different computers. This committee still needs a chairman, Codasyl's Executive Committee secretary, Thomas Rice of Honeywell, noted.

In announcing the projects, Rice urged people or organizations — users or implementors — interested in working on either or both committees to contact him at 50 Presidents Lane, Quincy, Mass. 02169.

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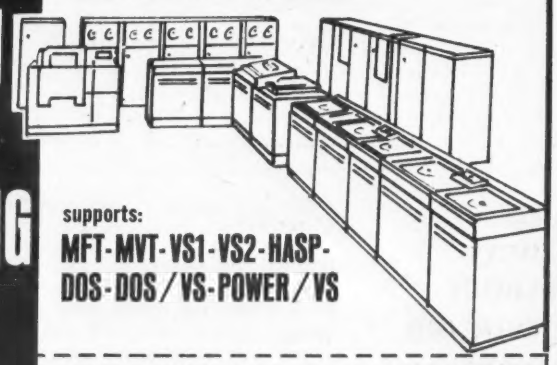

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'Tracer' Eases Fortran Debugs For Users of DG, DEC Minis

PALO ALTO, Calif. — Debugging of Fortran programs on Data General Corp. and Digital Equipment Corp. minis is simplified, and therefore done more quickly, with the Tracer package, according to the vendor, Information Processing Techniques Corp. (IPTC).

The debugging tool replaces core dumps and "randomly placed diagnostic . . . statements" for programmers working with DG's Nova and Eclipse or DEC PDP-11 configurations. Instead it prepares formatted reports of user-selected factors bearing on program execution.

The reports can show, for example, values assigned to variables, printed according to their data types. They can also document IF statement values or the flow of control through listing of statement labels when executed or subroutine names and arguments upon entry, a spokesman explained.

The choice of where the reports go as well as what they contain is up to the user, he added. The default option can be the console typewriter, a line printer or a CRT, but another alternative is a magnetic tape, which would be useful for later detailed analysis, he suggested.

Although Tracer adds some overhead to the program being debugged, this cost varies with the amount of support the debugging aid has been invoked to perform. The overhead would normally be eliminated through recompilation once the program is "clean" and ready for production, the company noted.

Tracer is currently available for use under DG's RDOS or under either RSX or RSTS/E on the DEC equipment. The package can be acquired for a one-time lease fee of $1,200 from IPTC at 2462 Embarcadero Way, Palo Alto, Calif. 94303.

GRI 99 Accounting Units Allow Single Run for Multiple Firms

N. BRUNSWICK, N.J. — A general accounting package incorporating inventory control, accounts receivable and general ledger systems for multiple companies is now available for GRI Computer Corp.'s System 99 small business computer, the vendor said.

Each of the three subsystems can be obtained and operated separately.

In addition to performing all conventional functions, the inventory system provides sales reports based on current activity and sales history data. Calculation of average costs, accumulation of product class totals and physical inventory capabilities are supported by this portion of the package, GRI said.

The general ledger routine is built on standard accounting principles and methods. It supports the creation of a chart of accounts, posting transactions to the accounts and producing records from them.

While all three portions of the GRI package allow multiple companies to be processed in a single run, the ledger routines also allow departmental income statements to be generated. These statements can include budget information as well as current month and year-to-date balances, GRI said.

RPG-II Version

The accounts receivable system follows the balance-forward method of processing.

The programs in the general accounting package are written in GRI's real-time version of RPG-II. Costs of the individual systems are $1,250 for inventory, $1,495 for general ledger and $1,650 for accounts receivable.

GRI's Filesort software, costing $1,670, is needed for the proper operation of any of these accounting systems, the spokesman noted from 870 Georges Road, N. Brunswick, N.J. 08902.

Pension Processing Runs on 16K IBM 3

FRAMINGHAM, Mass. — Firms can use a 16K IBM 3/10 to handle the recordkeeping and reporting provisions of the federal Employee Retirement Income Security Act if they acquire the Erisa/3 software from Alpha Systems, Inc., a spokesman claimed.

The software is configured around an Index Sequential (Isam) file and includes facilities for a data dictionary, for file maintenance and for a report dictionary as well as a report writer, he said.

Since a number of reports are required by the law, the system produces them without making the user resort to the report writer, the spokesman said. On the other hand, some reports will be available as separate cost extensions since they won't be needed by all users, he noted.

The data dictionary defines the characteristics of fields in the data base, but users may redefine, extend, alter or delete any of these definitions.

The file maintenance routines include a skeleton program to apply payroll updates to the pension file; this part of the system can be completed by the user or by Alpha, the spokesman added.

The report dictionary catalogs frequently used report routines so they can be invoked by name. The Erisa/3 report dictionary includes the means of updating what is stored under its control, he said.

The package is distributed largely in RPG-II source code, although several modules are available only in object form. The software costs $3,500, Alpha said from 1329 Old Worcester Road, Framingham, Mass. 01701.

Data General Adds Basic for Micronova

SOUTHBORO, Mass. — Data General Corp. has introduced a Basic language processor for use under a diskette-based disk operating system on its Micronova family of microprocessor-based computers. It is compatible with Basic already available on other DG products up to and including the Eclipse C/300, the vendor said.

Two Versions

Implemented in both single- and multiuser versions, this Basic is said to include extensions to the original Dartmouth Basic, particularly in the area of string arithmetic and matrix I/O operations.

The Micronova Basic was described as a subset of the language facilities that make up Extended Basic under DG's Real-Time Disk Operating System (RDOS).

Micronova development software includes, in addition to Basic and the disk operating system, an assembler, a Fortran IV compiler, a debugger, loaders and editors.

A code-compatible development system, designed to run on the DG Nova 3, can provide OEMs and end users the facilities of the larger system while building software for the micro family, a spokesman added.

Basic for the Micronova is available for a one-time fee of $1,000, the firm said from its headquarters on Route 9 here in Southboro, Mass. 01772.

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Other Systems in Good Shape

Monitor Gets Airline's TSO Control off the Ground

By Don Leavitt
Of the CW Staff

ARLINGTON, Va. — Allegheny Airlines, Inc. runs three on-line networks on one 4M-byte and one 2M-byte IBM 370/158 and it has established effective performance and analysis systems for continuing evaluation of its reservation and IMS functions, according to Henry Meyer, the director of system performance.

But until recently, there has been little to help in the evaluation and control of the airline's Time Sharing Option (TSO) operations, he added.

Now, however, the company has acquired a software package — TSO/MON from Morino Associates, Inc., based here — and the situation is improving.

It had to. Before getting the package, Allegheny used what little data was provided by the standard IBM-provided SMF selectable analyzer, Meyer said.

The standard TSO Trace facility and its data reduction software were used for diagnostic work but were "simply too resource-consuming to be used otherwise."

In addition, these tools did not provide the level of information management was accustomed to getting in connection with the reservation and IMS systems, he said.

Moving to MVS

All three networks are important to Allegheny — and are growing, he added. The primary operating systems are OS/SVS and the Airline Control Program (ACP), with migration to MVS planned for later this year.

The SVS system has an average concurrent load of 32 to 34 TSO and 70 to 80 IMS users during peak hours, and it's used for program development as well as production systems dealing with market planning, financial planning and economic forecasting, Meyer explained.

The Morino product is in place and doing its job. TSO/MON has been valuable in enabling the airline's management information services to increase the system's capacity while, at the same time, maintaining and even improving response time, according to John Shupe, the director of time-sharing services.

Initially, the detail reports found the system was running out of TSO buffer space and response was degrading during peak loads. This situation was easily corrected by increasing the number of TSO buffers, Shupe noted.

After that, a systematic approach for evaluating TSO performance was initiated by selecting two base-point indicators against which progress would be gauged, he said.

These indicators were the capacity of the system (command rate/hour initially determined to be 700 commands/hour during peak load) and TSO overhead (number of swaps/command which was averaging 2.5 swaps/command).

Additionally, the key factors of response time and CPU usage were also carefully measured for any variation. It was postulated that the swap rate of 2.5 per command was too high for the load of 700 commands/hour and was a bottleneck to increased capacity, Shupe said.

After analyzing several options, the number of TSO regions was increased from five to eight.

Response time and foreground CPU usage were both slightly reduced; the swap rate dropped from 2.5 to 1.4 swaps per command; and the capacity level of 700 commands/hour was increased to over 1,100 commands/hour, Shupe reported.

Improvement efforts have not been limited to just the system. TSO/MON's summarized reporting of interactive user work enabled Allegheny to focus quickly on inefficient use of TSO and take corrective action, Shupe noted.

The most dramatic example was a reduction in one user's foreground load from an average daily usage of 12 min of CPU time and 19,976 EXCPs to approximately 1 min of CPU time and 3,596 EXCPs.

This 92% savings in CPU time and 82% savings in EXCPs were made possible by simple modifications to the file handling and internal table processing of an interactive program, Shupe said.

Capacity Planning

TSO/MON was also used to provide detailed information on the load and usage trend of TSO over a three-month period of time. This information enabled Allegheny to operate both IMS and TSO on the same 370/158, resulting in considerable dollar savings, according to Meyer.

The reports are also being utilized as an aid by the airline's MIS Long-Range Planning Committee to forecast hardware and software requirements, Meyer added.

Users have applied their monthly reporting on number of logons, total connect hours, average terminal think times and TSO response times to their terminal procurement process, enabling them to better decide which terminals are needed and when they should be acquired, he continued.

Cost of Operation

The TSO/MON system has proven to be extremely efficient, especially when compared to other SMF or trace-based analysis systems, Meyer noted. The data collection interface has consistently utilized less than 2% of the CPU, and complete monthly reports are produced in 3 to 4 minutes of CPU time, he said.

Based on its early tuning successes, Allegheny feels confident a further increase in the number of regions will provide more than a marginal capacity increase without any reduction in user service.

The TSO/MON reports have also pinpointed heavily used commands that are candidates for rewrite. When completed, these commands will further improve system responsiveness.

For example, the in-house SUBMIT command when rewritten, will realize a 4:1 drop in command processor overhead for the average 200 times a day that it is invoked, Shupe estimated.

In addition, TSO/MON will also provide management with vital "before and after" performance information to evaluate its SVS to MVS migration in the coming year, Meyer noted.

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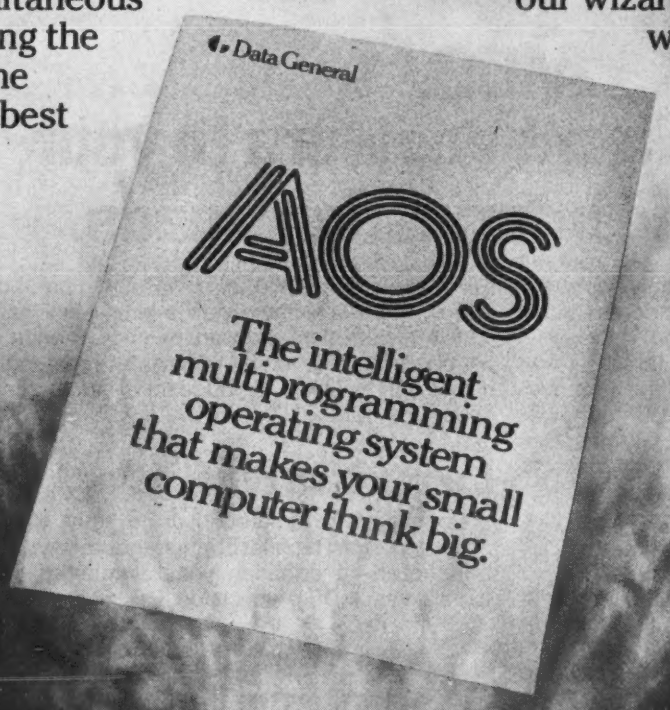

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Compiler Optimizes Fortran on Cray-1, Uses Vector Processing When Possible

MINNEAPOLIS — Fifteen Fortran programs representing portions of actual workloads were compiled at rates exceeding 50,000 line/min and then executed in a recent demonstration of a Fortran compiler for the Cray-1 computer system, according to a Cray Research, Inc. spokesman.

Included in the job mix was a large production run consisting of 2,300 statements, which ran multiprogrammed with a series of smaller jobs under the latest version of the Cray operating system, he noted.

The optimizing compiler, said to adhere closely to the ANS Fortran standard of 1966, makes use of the Cray-1 vector-processing architecture. It identifies and 'vectorizes' portions of programs amenable to such treatment, he added.

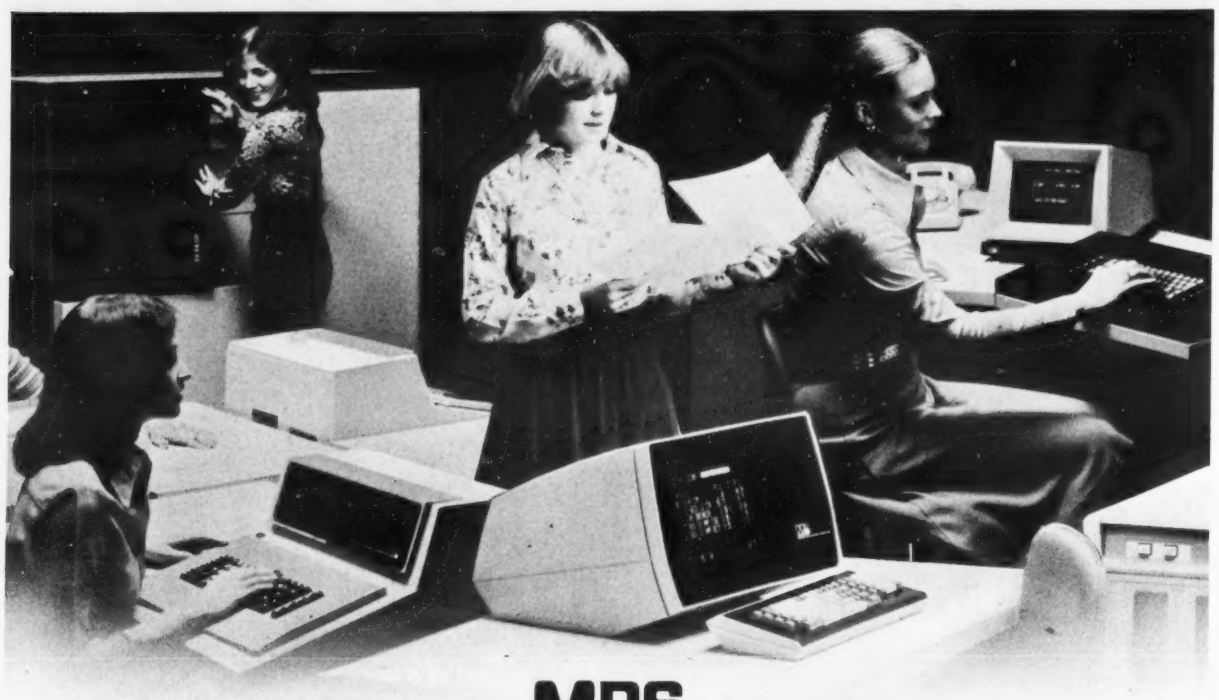
As a rule, a vector loop created by the compiler runs three to five times as fast as its scalar loop equivalent, he claimed.

Vector processing, a key to the Cray-1's fast computation rates, allows each arithmetic instruction to generate many results from a single sets of operands, the company said.

Because not all programs are amenable to vectorization, however, the Cray-1 provides a balanced approach by including both vector- and scalar-processing capabilities, the spokesman continued.

The Cray-1 Fortran compiler is being released at no cost to users of the company's systems. It comes in three models, with 256K, 512K and 1M 64-bit words of memory, and ranges in cost from $5 million to $8 million.

Cray Research is at Suite 213, 7850 Metro Parkway, Minneapolis, Minn. 55420.



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Package Models Pipeline Parts

DES PLAINES, Ill. — Pipeline, a pipe stress analysis program developed by UOP, Inc., uses finite-element techniques allowing internal modeling of complex piping components, a company spokesman stated.

Written in Fortran IV for interactive use on IBM 360/370 equipment, the program is said to have great flexibility in input and application. Either English or metric input provides for both English and metric output, the spokesman claimed.

Piping dimensions can be entered directly from piping isometrics in feet or in feet and inches, without regard to sequencing of piping layout, he added.

The Pipeline facilities are available on a service basis through UOP Computer Services here in Des Plaines or as a package which can be installed on a user's in-house computer.

The package requires 320K bytes of main memory and, in its normal configuration, costs $20,000.

That figure is, in some respects, a mid-range point, however, since there are "stripped-down versions" available on one end of the range and "bells and whistles" available for the most advanced user, the company said from 10 UOP Plaza, Algonquin and Mt. Prospect Roads, Des Plaines, Ill. 60016.

'Shadow II' Monitor Aids 360/370 Users

WELLESLEY, Mass. — Shadow II, the teleprocessing monitor brought into the U.S. and still marketed by Cullinane Corp. for use with its IDMS data base system, is now available to the more general IBM 360/370 community from Altergo Software, Inc.

An American affiliate of the original English developers, the vendor said the software runs under DOS and OS and their VS equivalents.

Costs start at $20,000 for a small DOS user, Altergo said from 20 William St., Wellesley, Mass. 02181.

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Decwriter III

Decwriter III Has Micro Controller

MARLBORO, Mass. — Digital Equipment Corp. has developed the LSI120 Decwriter III, a 1,200 bit/sec keyboard printer with a microprocessor-based controller board.

The Decwriter III can be used for interactive communication with a CPU, as a network unit or for any hard-copy keyboard send/receive (KSR) terminal application requiring 1,200 bit/sec reception.

Standard features of the KSR printer include a 180 char./sec effective print rate, a 1K-char. buffer to maximize throughput, an EIA interface, automatic "paper-out" switch, last-character visibility and a self-test capability, according to a spokesman.

The terminal is compatible with full- and half-duplex protocols, he said.

Optional features include a forms handling package; communications auto answerback and identification, he added.

The Decwriter III is priced at $3,990. In quantities of 100, the unit costs $2,270, which the spokesman said best reflects the price since the Components Group does not sell single units.

In any case, deliveries will begin this summer, he said from the firm's Components Group at One Iron Way, Marlboro, Mass. 01752.

For Effective Planning

DP Principles Seen Key to Net Design

By John P. Hebert
Of the CW Staff

BOSTON — Data communications is becoming an increasingly important aspect in the day-to-day operations of the retail environment and, in the future, it will be even more important, according to Robert J. Michael of The Carson Pirie Scott & Co.

It is natural to adapt the same principles used in designing and implementing DP systems to the management of communications systems, Michael told attendees of the recent National Retail Merchants Association (NRMA) 7th Annual Telecommunications Seminar here.

In a session on "POS and Computer Data Communications," Michael said communications systems — and especially point-of-sale (POS) systems — must be properly planned, developed and implemented because they are so critical to retailers.

Michael proposed a "Systems Life Cycle" (SLC) approach to planning and implementation of future communications systems to combat the problems in their planning.

These problems have involved a lack of tradition and standards; the impact of inevitable change; a communications mystique; language barriers; lack of direction; and the abdication of concern on the part of management and systems and communications people, he said.

The suspicion and reluctance between these three groups and "the existence of this kind of environment [have] contributed to a failure...to achieve the stated goals of data communications systems," he told the retailers.

"Systems people were often 'shut out' of the management control of systems development and implementation.

"It has been even worse for the person responsible for communications," the communications project leader for the Chicago firm told session attendees.

"We've been (and maybe still are) looked at as the 'order taker' for facilities, with little involvement in the planning and control phases," he said.

CW at NRMA Seminar

The SLC approach can be used to assist the DPers in properly planning and implementing systems. Communications people must be considered an integral part of SLC, particularly in light of the trend to more communications-based systems, he said.

This management tool has three major sections: technical systems planning, systems development and implementation. But, he cautioned, it is flexible and is meant to help achieve the goals of an on-time system implementation within the budget.

If a program manager feels he can combine two or more phases, he ought to be able to prove to everyone that the end results of the combined phases have been met, Michael said.

The first phase — planning — establishes the economic and technical feasibility of a proposed project by way of the preliminary systems requirements, design and cost benefit analysis, he said.

Take a basic idea and tentatively define the scope and objectives of the proposed application to estimate costs in an initial investigation summary, Michael suggested.

If the disposition of the proposal is "go," the next step is to make a preliminary system study, giving user management a basic plan for goal and policy impact evaluation.

(Continued on Page 34)

Telenet Plans Service Expansion To 38 Additional Cities by June

WASHINGTON, D.C. — Telenet Communications Corp. is planning to expand its packet-switched data communications service to an additional 38 cities by June, pending Federal Communications Commission (FCC) approval.

Also, beginning in June, Telenet will offer a Hotline data service for its network users.

The proposed expansion will bring the number of cities served by the Telenet network to 85, the company stated.

Public dial-in facilities are scheduled to be added at four of the added service points by June. They include Sacramento, Calif.; Louisville, Ky.; and Charlotte and Raleigh-Durham, N.C.

Other public dial ports at the remaining 34 cities will be added between the third quarter of 1977 and the first quarter of 1978, the company indicated.

Hotline Data Service

Telenet's Hotline service was designed as the functional equivalent of a private-leased line. Users will pay a flat monthly rate for unlimited traffic, according to a Telenet spokesman.

The cost of the service, he said, will be independent of distance.

When a Hotline user turns the terminal on, the network will automatically establish a connection to a prespecified address, he said.

The terminal can be connected to the network through a Telenet Access Controller (TAC) or a synchronous multiconnection channel or over a single asynchronous access line.

The service will cost $50/mo, plus the normal port and access line charges, and will be available at all the 85 Telenet central offices, as well as on private TACs located on user premises, the spokesman said.

Charges for Hotline ports are $125/mo in high-density-rate cities; $160 in medium-density cities; and $205/mo in low-density cities. Hotline ports on private TACs are $75/mo.

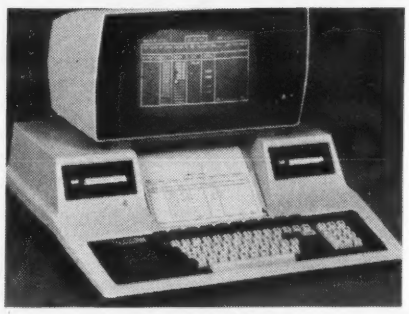
Telenet can be reached at 1050 17th St., N.W., Washington, D.C. 20036.

TI Announcements Include Addition to Series 700

HOUSTON — Texas Instruments, Inc. has launched a flotilla of terminals ranging from an intelligent addition to its Series 700 to a microprocessor-based system for pharmacies and a bidirectional read-only (RO) printer.

In addition to the communications-oriented product armada from its Digital Systems Division, TI brought out two floppy disk-based software development systems for users of its 990 mini/micro family (see story on Page 50).

The Series 700 Model 770 intelligent CRT terminal is based on TI's semiconductor memory technology and specifically the TMS 9900 microprocessing unit.Intended for DP and communications in distributed processing environments, it places data checking, validation and processing at the remote network site, TI said.



TI Model 770

Applications for the 770 include local reporting, sales analysis, payroll, freight scheduling and insurance claims processing, a spokesman noted.

The basic desktop unit utilizes read-only memory (ROM) and random-access memory (RAM) and has dual minicartridge tape drives, a 1,920-character CRT with a full Ascii typewriter-style keyboard containing a separate numeric pad and cursor control and programmable function key clusters, he said.

Supported by a real-time, multitasking firmware executive in the ROM, the 770's business-oriented Terminal Programming Language (TPL 700) reportedly simplifies the data entry, DP and software development functions.

Communications capabilities are optional, the spokesman noted.

Screen formats are developed under TPL 700 Forms; formats can be implemented for the terminal interactively by noncomputer trained personnel without actually programming lines of code, the company claimed.

TI's TPL 700 Procedures language for DP

(Continued on Page 37)

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Diagnostics Promoted as Critical Aspect of Networks

By John P. Hebert
Of the CW Staff

BOSTON — Communications facilities are sensitive, important and need to be maintained, Gerald Ryan, data communications manager for Allied Stores said at the recent National Retail Merchants Association (NRMA) Seventh Annual Telecommunications Seminar here.

Within the broad area of network planning, there is one small area of concern that must be included in the plans for any system — how to keep the network running once it's up, Ryan told attendees of a session on point-of-sale and communications.

"People are afraid of the subject of communications facilities," he said. "They would rather leave facilities management to the vendor because they view it as a mystical unknown.

"If the net is of value, then it is imperative [that] people are prepared to keep it running. Get a grasp of the essential problem of how it operates and the protocols involved," he said, echoing co-speaker Robert Michael of The Carson Pirie Scott & Co.

But he went one step further than Michael.

Include a written procedure and the equipment necessary to isolate network faults, he suggested, noting the objectives should be simple.

"Diagnostics depend on people," he said. Designate the responsibility to keep the network operational to one person. That operator must know how to isolate faults.

Fault Areas

The basic areas where faults are likely to occur, Ryan said, may be at the hardware level — the terminals or modems — or the lines. It may also be the communications software, but the DP people may argue this point, he warned.

In the past, if a network went down, the manager would dial 611 [for Bell repair service], give the circuit number to the clerk, tell him to fix the problem and patiently pace, he recalled.

CW at NRMA Seminar

But, the manager would inevitably be told the circuit was O.K., Ryan said.

"So he would call the other vendor — IBM — and the IBM employee would be first insulted by the call, then say the service representative would look at it after returning from a day off," he mused.

"Then, at the typical rate of $10 an hour, IBM would find that their equipment was perfect.

"Now you have the assurance that your system is in trouble from two giant vendors. More often than not, the problem resolved itself mysteriously," he said.

"The lack of information is a major problem. Today you can't afford to lack the ability to resolve problems," he contended.

Basic Testing Methods

To accomplish network diagnostics, he suggested some basic testing equipment and methods from his own experience.

"Allied uses a bit error testing device which connects to a modem for monitoring the digital portions of a network on point-to-point or multipoint lines," he said.

With it, testing can proceed step-by-step in a logical sequence to isolate the network leg posing problems, he said, adding digital diagnostics are sometimes necessary when a network won't work.

There is a new device, he continued, called a Datascope, which is also a stream monitor for the digital portion. It is intended to monitor the characters themselves to isolate software failures.

Another device Ryan uses at Allied is a simple voltage level meter.

"With this equipment, we feel we are able to keep the system up," Ryan said.

"And, we, rather than the systems people, should take the responsibility to keep the system running," he concluded.

DP Principles Seen Key to Net Design

(Continued from Page 33)

The evaluation, or feasibility study, will help determine how many people are needed, what the user has to supply and a clear-cut schedule and estimated cost.

"From now on, the project plan is updated in every phase, he stressed.

The feasibility or planning study is one of the most important, he said. In a communications-based system, the transaction types, urgency volume, growth rates and accuracy needed are involved in the plan.

"Operational management requirements, cost justification and technical factors are so interrelated that several alternative plans may be formulated and adjusted as planning proceeds."

Work with a financial analyst to come up with a cost and benefits plan which will include the manual operating cost of the proposed system, the computer cost and the development cost, he advised.

Update the plan and summarize this phase in a report for management, indicating what has been found. Make sure management approves the system proposal before proceeding, he added.

During the systems requirements phase, a total study of requirements is made. The factors in this phase include workflow analysis, job description, data elements definitions, constraints, controls, backup and liability procedures, he said.

The implementation planning phase answers the "hows" and is possibly the most important phase, he said. It contains a checklist for what has been done and when and who has signed-off the proposal.

The user, systems people and technical services people should get together to agree on a test schedule, Michael said, adding that up to this point, it is possible to "go back to square one, if necessary."

After a test, the system is ready to be implemented. "One word of caution: Now is not the time to make changes. If the user has a problem at this point, tell him to start with the initial investigation summary and see if it should be incorporated," he stated.

Depending upon its size and complexity, the converted system undergoes a thorough post-implementation review about six months later, he said.

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Data Communications Dictionary

courier

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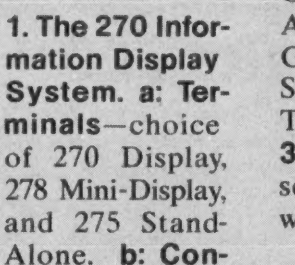

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Two EFT Units for Retailers Available From TRW

LOS ANGELES — TRW Corp. has introduced two electronic funds transfer (EFT) terminals designed for retail store sites.

The modular EFT-154 and integrated EFT-115 reportedly allow a financial institution to extend its computer system to retail users' customers who want to cash checks, make savings and checking account deposits and withdrawals and loan and club payments.

Each of the terminals can give a salesperson real-time access to the status of customer credit, demand deposit and savings account files, according to TRW.

The devices provide customer identification and check verification through the use of authorization codes. Capabilities can also be established for direct transfer of funds from a customer's account to the merchant's account, as well as electronic deposits or funds withdrawal, the company claimed.

The TRW EFT-154 consists of a salesperson-operated keyboard with built-in display and magnetic card reader; a document printer for receipt validation; and a customer-operated personal identification number (PIN) pad.

Terminal Transactions

The EFT-115 combines that hardware into an integrated unit designed for use at supermarket checkout stands.

The overall system design allows EFT terminals at sales counters to share a common communications line, TRW said, adding data can be transmitted directly to the DP center using TRW programmable communications interface devices or TRW terminal processors.

The processors reportedly provide an interface for the terminals with any CPU in use at a financial institution. The terminal processor can control up to 200 EFT terminals in a maximum of 20 different locations, the company added.

A typical EFT-154 system capable of serving one store includes two keyboards, printers and PIN pads plus the programmable communications interface device and is priced from $6,000.

Prices for an EFT-115 system with the programmable communications interface, placed in a typical supermarket with eight checkout stands, start at $11,000.

TRW is located at Suite 620, 9841 Airport Blvd., Los Angeles, Calif. 90045.

COI Controller Replaces IBM 3271

BETHEL, Conn. — Computer Optics, Inc. (COI) has brought out a direct replacement for the IBM 3271 remote terminal controller which can handle up to 16 devices, a spokesman said.

Expanded Version

The microprocessor-based CO: 8271-2 is an expanded version of the company's CO: 8271-1 minicluster controller. It can control interactive CRTs or printers in any combination, COI claimed.

The 16-terminal controller is available with IBM's Synchronous Data Link Control (SDLC) or Binary Synchronous Communications (BSC) protocols, the spokesman added.

The CO:8271-2 costs about $12,000. COI is at the Berkshire Industrial Park, Bethel, Conn. 06801.

Salesperson gets ready to initiate transaction on TRW EFT-115.

NCR Links Registers With Mainframes

DAYTON, Ohio — NCR Corp. has developed a communications utility package to link NCR mainframes with the company's Model 250 electronic cash registers.

The NCR Century/Criterion Communication Utility (CCU) is a self-contained utility which works with 250 models equipped with a data capture cassette and polling feature, NCR said.

An NCR CPU can automatically dial up the terminal over the switched network and record the information from the cassette to disk for subsequent processing.

The CCU software eliminates the need for initial polling by a minicomputer.

It works with any Century 101 or larger system and all Criterion systems. The minimum requirements are a 32K processor, twin disks, a card reader, communications multiplexer and associated adapters and modems.

The CCU, available for immediate delivery, has a $125/mo license fee, the spokesman noted from Dayton, Ohio 45479.

Controller Lets Tally Printer Emulate Remote Stations

KENT, Wash. — A microprocessor-based communications controller for Tally Corp.'s Series 2000 line printers reportedly emulates IBM, Control Data Corp., Univac, Honeywell Information Systems, Inc., Burroughs Corp. or any other remote print station.

The Tally communications interface provides for synchronous or asynchronous data transmission on full- or half-duplex point-to-point or multidrop lines.

It is capable of speeds up to 9,600 bit/sec, 1,000 character single or double buffering, full error correction and Ascii or Ebcdic code transmission, according to the firm.

Equipped with the communications controller, the Tally 2000 sells for $7,160. Typical one-year rental rates are $430/mo, including maintenance, Tally said from 8301 S. 180th St., Kent, Wash. 98031.

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Computek Series 200 Enhanced

BURLINGTON, Mass. — Computek, Inc. has enhanced its Series 200 user-programmable terminal system with a floppy disk operating system (FDOS) and a 64K-byte memory.

The Series 200 FDOS includes a diskette macro assembler, source text editor, linker loader, two screen-oriented debuggers and a library of utility programs.

The heart of the system, according to the firm, is the FDOS Kernal Program, which provides a link between all systems programs and the FDOS so users do not have to reprogram the terminal system as long as power is available.

Two levels of diskette drivers are provided with FDOS. The basic level of physical drivers will read, write, pack and unpack records from the disk addressed by drive, track and sector number, Computek stated.

Logical drivers provide automatic updating of the file directory as well as OPEN, CLOSE and CREATE commands, it added.

FDOS will run on stand-alone or clustered Series 200 configurations and requires 16K bytes of memory.

A single-station stand-alone Model 200/10 FDOS terminal system with CRT/keyboard processor, 32K bytes of memory and two floppy disk drives is priced at $11,230.

A clustered Model 200/40 (four-station) FDOS configuration is priced at $18,555 or $4,640 per terminal.

Computek also offered a 64K-byte memory for the Series 200 terminals, doubling the current maximum, a spokesman explained.

The memory is available in 8K-byte blocks of read/write random-access MOS memory; up to 4K bytes can consist of read-only or programmable read-only memories, he added.

Computek is at 63 Second Ave., Burlington, Mass. 01803.

Terminal Transactions

IBM 3604-5, -6 Can Now Handle Magnetic Codes

WHITE PLAINS, N.Y. — Magnetic stripe encoding/reading is now available for models 5 and 6 of IBM's 3604 finance communication terminal, extending the feature to all 3604 models.

Designed to boost teller productivity by reducing keystrokes, the device reads customers' magnetically encoded passbooks when they are passed through a slot in the machine's surface.

Withdrawals and deposits are entered through the keyboard. When the transaction is finished, the passbook is automatically updated with the encoder/reader, according to an IBM spokesman.

The enhancement also can read bank cards that use American Bankers Association Track 2, a 75 bit/in. magnetic code used for credit data, he said.

The price of the feature, which can be field-installed, is $28/mo under IBM's Alternative Term Plan. It can be purchased for $775.

First shipments are scheduled to begin in August from IBM's Data Processing Division at 1133 Westchester Ave., White Plains, N.Y. 10604.

Units Get Keyboard

MINNEAPOLIS — Research, Inc. has added a detached keyboard and a separate readout monitor to its Teleray terminal series.

The detached keyboard configuration is available as an option on the upper case Model 3541, the upper/lower case Model 3741 and upper/lower case Model 3841.

The detached keyboard option is priced at $50 or $2/mo. With a numeric pad, it costs $100 to purchase or $4/mo on lease.

Readout monitors are priced at $100 below the single-quantity purchase price of each terminal, the company's Teleray Division said from Box 24064, Minneapolis, Minn. 55424.

CDC Adds Plato Terminal

MINNEAPOLIS — Control Data Corp. has introduced a low-priced education terminal that reportedly features increased reliability and options.

The terminal is intended for use with the firm's Plato computer-based education system and costs 23% less than the previous Plato terminal; maintenance costs are 66% lower, according to CDC.

A primary feature is a touch-screen response capability. Questions can be answered, images moved to different areas of the screen and new images displayed by the pressure of a fingertip.

Purchase price of the Plato terminal is $6,800, regardless of quantity ordered, compared to $8,800 previously. The touch-screen capability and a local interface modem are included in the purchase cost, the spokesman said.

The terminal is also available on a lease basis, with the monthly rates reflecting quantities ordered, the spokesman noted from CDC at Box 0, Minneapolis, Minn. 55440.

The 36-bit DEC

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TI Introductions Include 'Smart' Series 700 Addition

(Continued from Page 33)
applications supports structured programming and features a logical I/O capability allowing an operator to access files by name.

In addition to these features, an IBM 3780 emulation package reportedly provides direct communications with an IBM host CPU using the Binary Synchronous Communications protocol.

TI Silent 700 Model 742 terminal and Teletype Corp. communications protocols are also available for the 770, as is a TI terminal polling system (TPS) for data collection and distribution, according to the firm.

Model 770 options include RAM expansion from the basic 8K to 24K bytes, an integral Silent 700 30 char./sec nonimpact printer (the 770/2) or a 150 char./sec Model 810 RO printer; and display graphics, communications interfaces, modems and automatic calling units.

Internal modem kits, also available as options, allow asynchronous communications to 1,200 bit/sec with Bell 202T- and 202S-compatible modems, as well as synchronous transmissions at 2,400 bit/sec from Bell 201C-compatible devices for operation on the dial network or leased lines, TI stated.

Interface kits for external modems are also optionally available for asynchronous operation at 300- and 1,200 bit/sec and transmissions at either 2,400- or 4,800 bit/sec synchronously.

The basic 770/1 without printer costs $6,400 or $220/mo on a one-year lease; maintenance is priced at an additional $72/mo.

The 770/2 with the 30 char./sec thermal printer costs $7,500 to buy and $300/mo to rent on a one-year lease; maintenance costs $87/mo.

Model 911

Internal modem kits range from $1,065 to $2,075, while the interface kits cost $530 to $925.

TI's microcomputer-based pharmacy system was designed to operate on-line to a host CPU.

The Model 400 features the Model 911 CRT, a Model 810 impact printer and a Model 990/4 microcomputer with up to 56K bytes of memory.

The terminal system reportedly supports up to four CRT workstations and two printers. Internal modems or an external Bell data set interface provide both synchronous and asynchronous communications between the Model 400 and the host, TI claimed.

Terminal system software consists of a memory-resident operating system with what is said to be extensive CRT management capability and communications support.

The pharmacy system costs $7,075, with quantity discounts available. Delivery will start in the second quarter.

The Model 911 is intended for use with the TI 990 mini/micro computer family and consists of a CRT, separate keyboard and a controller which mounts in a 990 CPU chassis.

It is available in either 960- or 1,920-character screen versions for display of 5 by 7 dot matrix characters, TI said.

An arrangement of refresh memory mounted on the controller with the video signal transmitted through coaxial cable from the computer display offers high transmission rates and low-cost cabling, TI claimed.

The configuration also is said to conserve memory on the mainframe. The CRT and keyboard can be located up to 2,000 ft from the 990 CPU, TI added.

The 1,920-character version is priced at $1,700; deliveries will begin in July.

Model 810 Impact Printer

The Model 810 RO printer operates at 150 char./sec and can be used as an I/O device for minicomputer and microprocessor systems, for auxiliary forms printing for intelligent CRTs and as a remote office output printer in a communications network.

The 132-column Model 810 is a multicopy device with bidirectional printing. Effective throughput of the 810, TI claimed, is from 60 line/min at 132 columns up to the maximum of 440 line/min at an average 10 char./line.

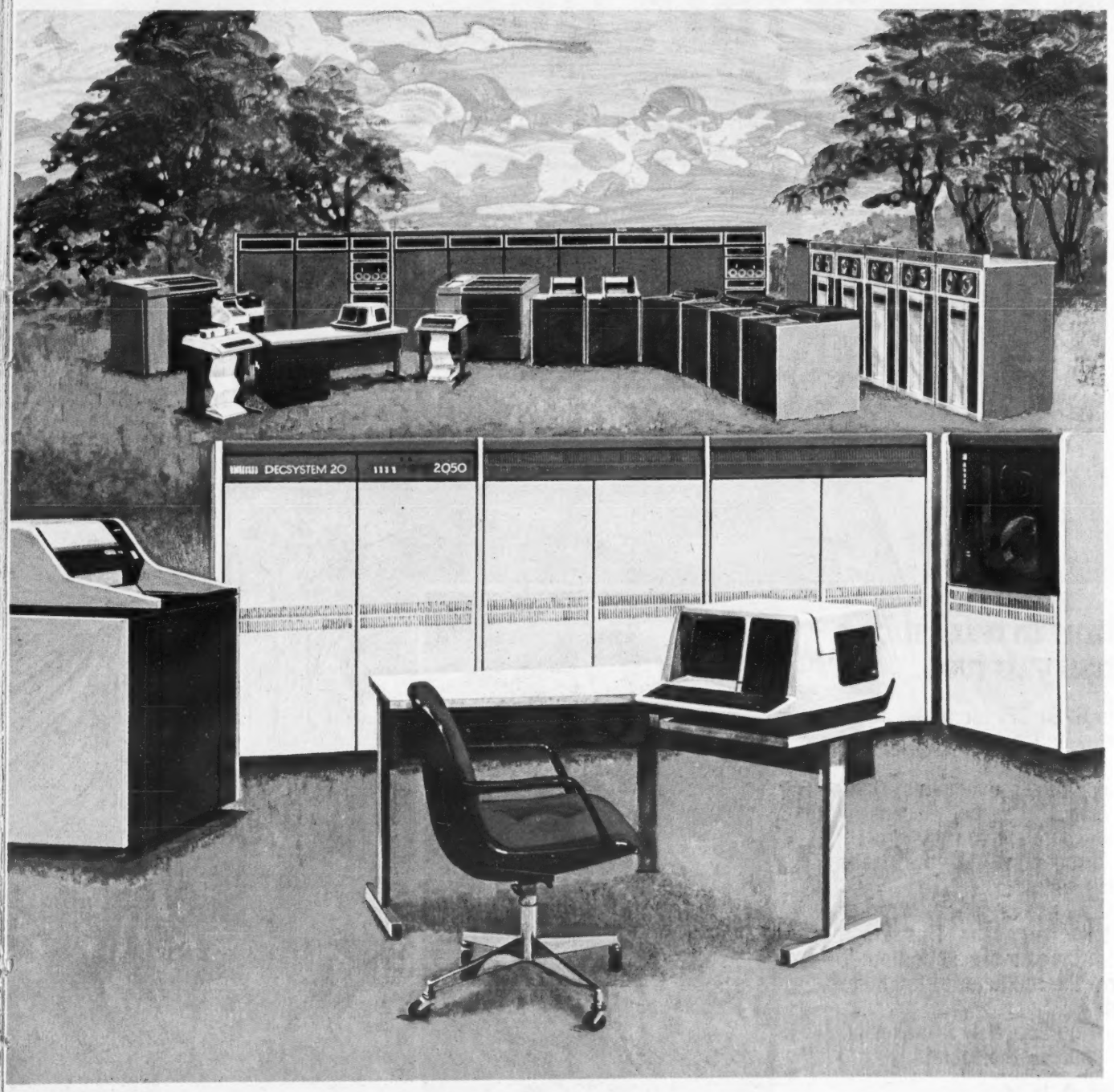
Standard features include a 64-character Ascii set in a 7 by 9 dot matrix print format, a 256-character communications buffer, a self-test feature and an adjustable tractor drive for forms from 3- to 14-7/8 in., the company said.

Optional features include the full Ascii set, compressed character printing and 11 forms lengths for standard forms usage or vertical forms control.

Deliveries of the Model 810 are scheduled for April. The basic 810 costs $2,250.

TI's Digital Systems Division can be reached at P.O. Box 1444, M/S 784, Houston, Texas 77001.

SYSTEM-20.



Terminal Transactions

There's a very thin line between making it or breaking it.

That's important to remember with high-density drives.

The advantages to 6250 CPI recording — like higher data transfer rates and a reduction in library size requirements — are numerous.

But there are also some disadvantages. One of them is the masking by the GCR format. Because of it the only way to get an accurate error listing is through sense byte interrogation. Ask your Graham product technology man why.

Because of unnoticed errors serious degradation in read/write reliability can occur. This is compounded by debris from bargain-priced computer tapes, which don't have the modulus of toughness and durability of Epoch 4.

Get certified error-free Epoch 4. It makes all the difference. Now — and for the future.

GRAHAM MAGNETICS

Graham, Texas 76046

Study Finds COM Doesn't Reduce Paper Use

WALTHAM, Mass. — The use of computer-output microfilm (COM) does not decrease the paper volume produced by the central computer, according to a study by the International Data Corp. (IDC) here.

In fact, the study found, the paper and COM film volumes continue to increase yearly at most user sites. The COM output in some cases is not reducing output, and there are new or archival type applications that were never printer-oriented, IDC said.

The study, "The Computer Output Microfilm Market," was based on a survey of 157 COM users across the nation and identified patterns of COM use to determine whether COM output is in competition with other output media.

Total volume of output at central sites will increase from 122.5 billion original pages in 1975 to 277 billion pages in 1980 as a result of growth in paper and COM output, the report predicted.

There were 2,200 COM recorders installed in the U.S. at year-end 1975. By year-end 1980, there will be 5,200 installed, IDC said.

By 1980, 24% of the estimated 110,900 general-purpose computer sites will use COM compared with 18% of the 1975 figure of 59,500 sites.

The average in-house user, which currently represents two-thirds of the current COM sites, has one recorder, operates 48 hour/week and produces 6.6 million original frames and 42 million duplicate frames.

The average service bureau, which will represent only 30% of the predicted 1980 installations, has two recorders, each of which is operated 90 hour/week, and produces 28.7 million original frames and 180 million duplicate frames.

COM users in general produced a total volume of 20 billion original frames and 127 billion duplicate frames at year-end 1975, according to the report. By 1980, the report forecast, the total volume will reach 54 billion original and 334 billion duplicate frames, more than double that of 1975.

Some of the user preferences noted in the report included faster COM recorders with improved software, the ability to use a 6,250 bit/in. tape drive in the future and recorders that are easy to operate, such as those with in-line film processing.

Rain or Shine, 370 User Prepared

PITTSBURGH, Pa. — Faced with the possibility of spring floods, Gateway Data Systems here moved its IBM 370/125 plus peripherals from the basement of its building to the 17th floor with only 8.5 hours downtime.

Floods were predicted as a result of the severe winter [CW, Feb. 14] that had solidly frozen the Allegheny, Monongahela and Ohio rivers and dumped huge depths of snow in the area.

"We were faced with the possibility of having to move out of the building at a minute's notice, so we decided to move to higher ground on the 17th floor of our building. We planned a temporary move now, with a move to other permanent quarters on the 17th floor at a later date," according to John Weaver, president of Gateway's parent company.

Normally, the moving of a computer facility requires a great deal of planning for the electrical power distribution system as well as a period of a week or longer to do the hard-wiring of the room.

Power Distribution System

"We couldn't afford to be out of business for 24 hours, let alone weeks," Weaver said. So, to circumvent the time-consuming hard-wiring of the new room, Weaver purchased a portable power distribution system, the Computer Power Center (CPC), from Computer Power Systems Corp. of Costa Mesa, Calif.

The CPC, which required only a single hookup to the main building wiring, performs all of the necessary power distribution to the various elements of the system through shielded flexible conduits.

It not only distributes the power, but isolates the computer system from any transients or other disturbances in the building wiring through the use of an electrostatically shielded, computer-grade isolation transformer, a manufacturer representative noted.

Configuration changes using the CPC generally require nothing more than moving the flexible circuits from one location to another, he added.

"The isolation aspect of the Power Center was important to us," Weaver said. "When we were in the basement, we could hook up directly to the mail line from the power company.

"On the 17th floor, we need isolation to protect our system from the other disturbances that we would have to live with if we just plugged into the normal building wiring."

The all-IBM Gateway system consists of the 370/125, several 3340 disk drives, a 1403 printer, a 2501 card reader, a 1442 card punch, a 3881 optical mark reader and several 3270 CRTs.

"We have a current power usage of 17.78 kV, but we ordered a 45 kV CPC because it gives us the flexibility to expand our system at a later date with little or no pain with re-

(Continued on Page 42)

Also Lowers Costs

Independent Gear Speeds CPU Services

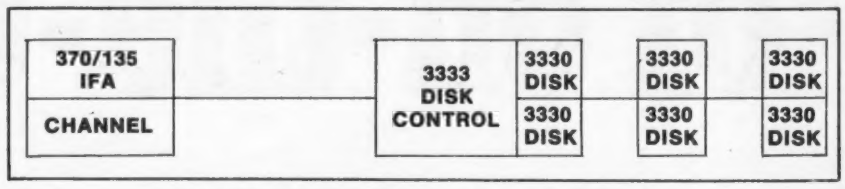
DENVER — The State of Colorado Judicial Department, which initially implemented computerized operations in 1967, recently found a way to speed service to system users while lowering operational costs.

The predominately on-line IBM 370/135, which supports remote terminal communications between the system and various court clerk offices and the attorney general's office, was enhanced with the installation of an independent's magnetic disk drive and telecommunications control subsystems.

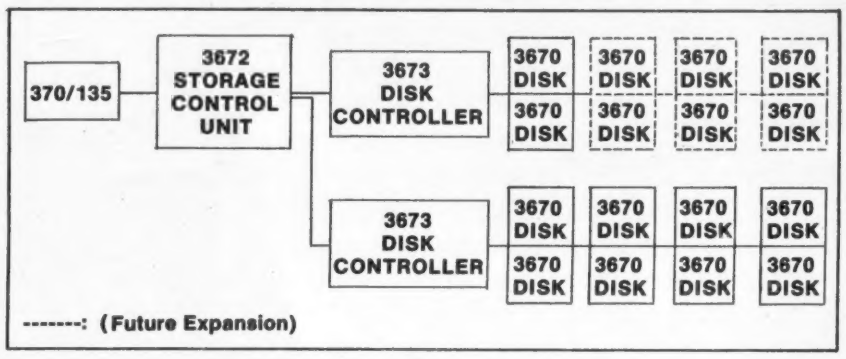
The previously used disk system had an IBM storage facility with storage control functions shared between the Integrated File Adapter (IFA), resident in the CPU, and IBM 3333 storage control units integrated with the lead dual modules of 3330 disk files.

The switch to independent equipment involved the substitution of an external Memorex 3672 storage control unit for the IFA. Connected to the 3672 unit is a pair of Memorex 3673 disk controllers, each supervising a string of Memorex 3670 Model 1 disk storage modules.

Using the Memorex equipment with the IBM 370/135 has lowered the department's net rental cost for both peripheral systems, speeded access to disk-stored information by 10%, improved the monitoring of subsystems operation and cut CPU response time to terminal-initiated requests by an average of 67%, a Memorex spokesman said.



Judicial Department's Previous All-IBM Configuration



370/135 After Installation of Memorex Gear

The changeover has additionally given the courts an ability to expand to four 3673 disk controllers each with eight double spindle modules of 200-million (or 400-million double density) capacity versus a maximum of two 3333 disk controllers and 16 dual module disk devices.

As with the disk subsystem, the Memorex 1270 terminal control unit, used by the department to control communications between the CPU and 43 CRTs, eliminated the use of an integrated communications adapter with the 370. Internal machine cycles were freed and, despite the extra external control unit, net rental is down slightly, the spokesman continued.

The average response time for data to appear on a terminal once a request is keyed down from 15 to 5 sec, he added.

Among the data bases now established by the Colorado Judiciary are a court system for name index calendar and register of actions; alimony and support; motor vehicle registry, fees and fines; bonds; probation and jury selection.

Techniques of Data Compression Can Prolong System's Life Span

By Richard Haasz
Special to Computerworld

When examining data compression, two questions generally come to mind: Are the needed machine cycles justified by the few fields containing repetitive characters to be squeezed out? Is the programmer familiar with handling the variable-length records that inevitably result from this space-saving technique?

On the surface the problems of data compression appear to outweigh the benefits. This is probably the result of thinking of data compression solely as a space-saving technique.

But as a technique which is very easy to use, data compression can contribute substantially to the life span of most computer systems.

Data compression is not the proverbial fountain-of-youth sought after by DP managers. Nevertheless, it is a fact of life that many systems die prematurely when their files are no longer adaptable to changing requirements (e.g., new fields which are longer than any free space in the record, increases in field lengths that necessitate massive programming changes, fragmented dead space from fields that are no longer needed).

Any technique that can increase the life span of a system means more payback from the initial development expense and a postponement of the cost of reimplementing the system.

The programmer learns early in his career that the cost of file space is at a premium and must be managed frugally. As he progresses to systems design, we find him packing data into codes, packing his numbers, questioning the necessity of each byte in a

(Continued on Page 42)

132-Column CRT Interactive

SAN DIEGO — A 132-column by 30-line CRT has been introduced by Datagraphix, Inc.

The terminal, which has an 8.5- by 11-in. screen, has full functional interactive I/O compatibility with DP systems, according to a spokesman.

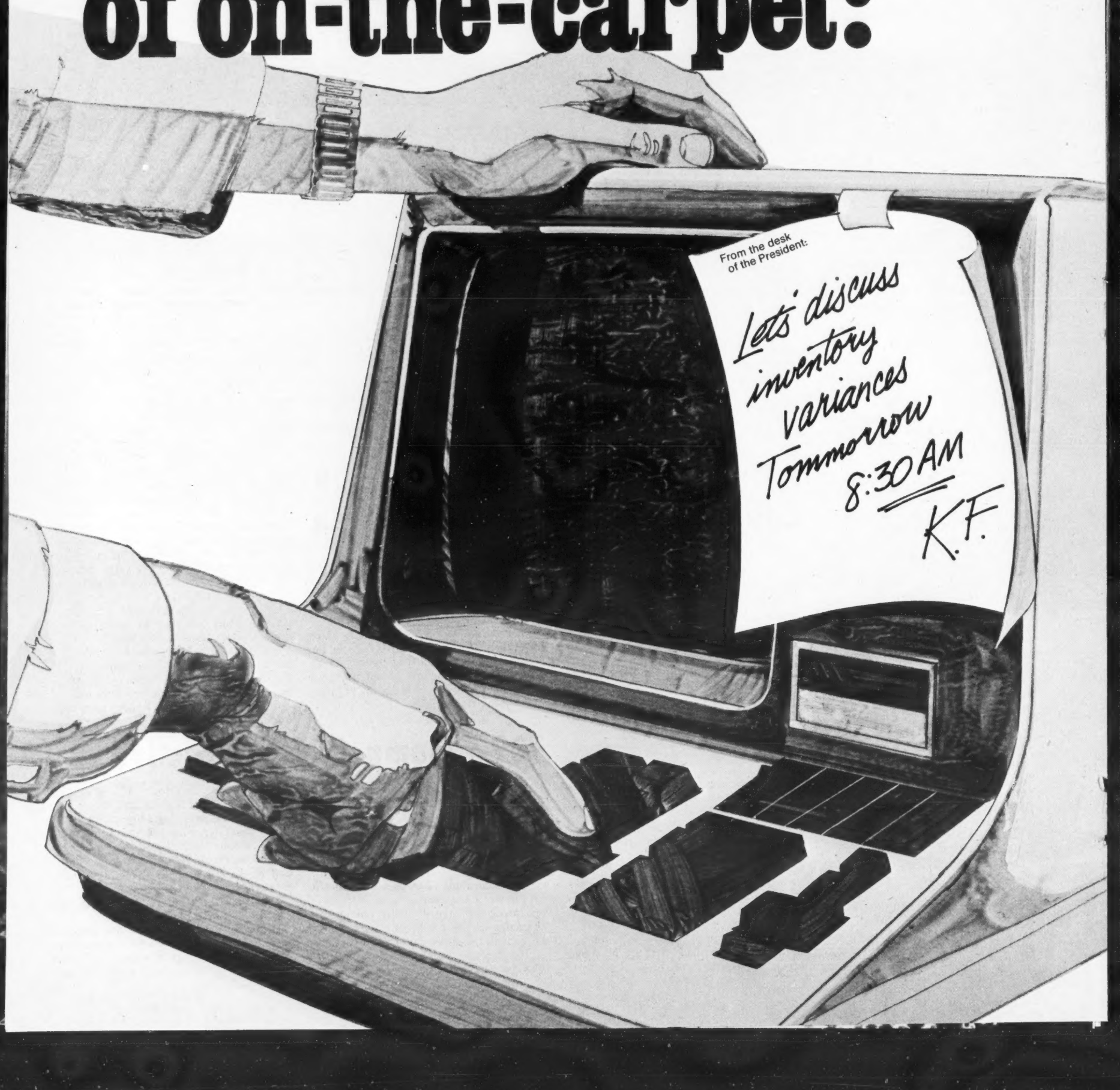
The Datagraphix 132A uses a Charactron tube in which the electron beam is transmitted through a "stencil" which contains the character set. As the beam passes through the stencil, the entire character is produced on the screen.

The unit is controlled by an Intel Corp. 8080A microprocessor. It offers a 96-character Ascii set, 60- or 120-line buffer, cursor control, single-line editing, tabbing, scrolling, dual brightness, multiple asynchronous transmission modes at 110- to 9,600 bit/sec in full- or half-duplex mode and RS-232C output to 132-column serial printers.

The 8080A permits future extension capabilities, the spokesman said.

The basic unit, with an 8K buffer memory with 16K optional, costs $3,950. Delivery will begin in August, the firm said from P.O. Box 82449, San Diego, Calif. 92138.

To the VP of manufacturing who'd rather be on-line instead of on-the-carpet:



An on-line inventory management system is a nice thing to have when you need answers in a hurry. Especially if the system gives you the controls you need to make sure the answers are not full of surprises.

To our V.P. of manufacturing, such a system is more than a nice idea; it's absolutely essential. By being on-line to an interactive, multiuser Prime computer programmed to handle Prime's specific needs, he has everything under control. Last year, for example, the system helped his organization control the variance between physical and book-value inventory to less than 0.1%!

So if you've been spending too much time on the carpet explaining variances more like 5%, a Prime computer can help you control your inventory as tightly as our V.P. controls ours. In fact, the money you'll save by reducing your variance will no doubt pay for the complete system.

Depending on how many people in your organization need answers in a hurry, you can get a Prime computer that handles up to 63 terminals simultaneously. You can develop the inventory management system that fits your needs perfectly, using the software tools available with PRIMOS, Prime's virtual memory management operating system. PRIMOS gives you access to powerful file processing and CODASYL-compliant database management systems; a forms management system; and a choice of languages including ANSI'74 COBOL, FORTRAN IV, RPG II and BASIC.

Large databases can be managed with ease since on-line disk capacity can be as large as 2.4 billion bytes; main memory as large as 8 million bytes.

Typical systems for database management applications range from $100,000 to $350,000, or about $2,170 to $7,600 per month if leased directly from Prime.

To find out how being on-line to a Prime computer can keep you off the carpet, talk to Robert P. Berkowitz, vice president of manufacturing, Prime Computer, Inc., 145 Pennsylvania Avenue, Framingham, Massachusetts 01701.

PRIME

Prime can help

V 11 2 MAR 21 77 UMI

OBM Enhances OCR System

MELBOURNE, Fla. — Optical Business Machines, Inc. (OBM) has unveiled a 600 char./sec matrix printer option for its Laser OCR-ONE optical character recognition (OCR) system.

The PB-600 can be utilized to print such things as original or edited information as the data is scanned; listings of errors that might occur while scanning; and batch information such as batch totals, record counts or document counts, OBM suggested.

The Laser OCR-ONE with its printer can also be used as an off-line print station for tapes prepared elsewhere, OBM said.

The printer is manufactured by Florida Data Corp., an affiliate of OBM.

The PB-600 printer costs $7,000; lease terms are available, OBM said from 804 W. New Haven Ave., Melbourne, Fla. 32901.

erisa?

If the personal penalties for management violation of the Employee Retirement Income Security Act of 1974 have you worried, then take heart.

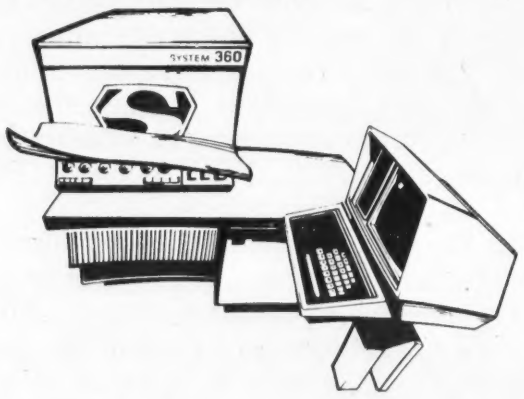
Wang has 360/370, Burroughs, Honeywell and Univac, ERISA software, designed, installed and running, coast to coast, safeguarding the pensions of more than one million workers and protecting the careers of their managers.

For more on ERISA, call Joe Nestor (617) 851-4111, Wang Laboratories, Lowell, MA 01851. In California, call Carl Tarascio (714) 631-0138.

WANG

dc

The Dearborn S/360.
It's not like leasing an ordinary mortal machine.



The S/360 machines from IBM are good.

The S/360 machines from Dearborn are super!

We give them power beyond that of ordinary machines. Six partitions instead of three, for example. Support for full-speed 3330's, CRT console support, load balancing, resident transient and directories, disk chained fetch, warm-start support and job accounting and measurement reports.

You don't have to have all this super performance: you can start with a 6 to 10K spooler that will leap over production bottlenecks instantly.

There's even 1400 program simulation on the Dearborn 50's and 65's.

Transforming an *ordinary* S/360 lease into a *Dearborn* S/360 lease is easy. Just step into the nearest phone booth and call us.

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Users Can Enhance System Life With Data Compression Methods

(Continued from Page 39)

field and trying to justify the existence of each field.

Often, the ultimate user of the system must argue the need for data space for the infrequently occurring data item. Then comes the agonizing decision on how much empty space is to be left in each record for future expansion.

This situation is necessitated by the fact tha the record as viewed from the program is the same as the one taking up space in the file — it is the real record.

Virtual Records

The concept of a "virtual record" separates the attribute of length of the record in the program from the length of the record in the file. With data compression, the record on the file is only as long as its data requires.

The data in the program appears to be much longer, having multiple occurrences of repeating fields established generously and accumulators large enough for huge amounts.

Imagine, for example, a payroll master record with 20 deduction segments, each 60 bytes long; year-to-date fields defined to hold millions of dollars; name fields long enough for William Somerset Maugham and address space for six lines of 40 bytes each; filler for future expansion in the order of hundreds of bytes, in generous pools and at the end of each record.

Only the read and write routines see the real record because they contain the calls to expand and compress, respectively; the rest of the program deals only with the expanded, fixed-format, virtual record. All filler, of course, is cleared to spaces or low values to allow compression.

Numeric fields with long strings of leading zeros are easily compressed, thereby encouraging the use of large numeric fields. Name fields with trailing spaces are easily compressed, thereby encouraging the use of large name fields.

Importance of Layout

By designing record layouts with generous field sizes, the file will not prematurely strangle the system because of heavy inflation increasing field dollar values beyond the imagination of the designer . Nor will persons with long names have to settle for truncated variations to save a few extra bytes in everyone else's record.

Address need not be handled by a variable number of segments technique: eight lines can be allocated in the virtual record and only as much space will be needed as the data on those lines dictate. Entire record segments can be included in the virtual record design and left unused until a later approval to collect and record it; just initialize it to spaces and it will be compressed out.

A dozen extra amount fields can be included for future use on the slightest justification, set to low values and all compressed out of the real record. A hundred bytes of filler at the end of each record, initialized to spaces, reserves space in every program for additional data elements to meet future requirements — set to spaces and watch it get compressed out.

When changing requirements remove the need for a data element, just clear that field in every record and it will be compressed, thereby reducing the file size.

There are various compression techniques, each involving trade-offs in computer cycles and file space. My preference is for callable subroutines (one to compress and the other to expand) which compress out only the spaces and low values (nulls).

This technique copies a data record replacing strings of spaces and low values with a two-byte control block, thereby shifting data to the left. The first byte of the control block is a low-value byte to identify this as a control block for the expansion routine. The second byte uses the first bit to signify spaces or low values and the other seven bits for the string length.

If one control block cannot represent a string because it is too long, then another control block follows it, each representing up to 127 spaces or low values. This technique permits all special characters to exist in the record.

Obviously, a single occurrence of a low value must be converted to a control block (having a length field of 1) to avoid being mistaken for a control block at expansion time. The compression and expansion subroutine calls are placed into the write and read routines, respectively, so all other parts of any program see only the fixed-format expanded record.

Because the subroutines deal with the entire record, they do not need to know any of the attributes of any individual field. Only the record and its length are passed to each subroutine; only a record and its length are passed back.

The benefit of compression is not to save a few bytes here and there in a tightly defined system, but rather to take away the necessity for tightly defining our systems. We no longer have to justify the inclusion of data elements or segments in a file layout nor justify their size. The era of tightly defined systems is over.

Haasz is a senior systems analyst with the Office of Computer Services and Information Systems for Metropolitan Dade County, Florida.

Fairchild Offering CCD Memory Sample

MOUNTAIN VIEW, Calif. — Fairchild Camera and Instrument Corp. has unveiled a 64K-bit charge-coupled device (CCD) block-addressable memory. Fairchild will be aiming the product at the bulk memory market, such as drum and disk.

"The 64K CCD memory is the first semiconductor device suitable for the bulk memory market, which is four times the size of the computer mainframe market," according to a Fairchild spokesman.

Potential Customer Influence

parameters were heavily influenced by potential customers, and the device meets the requirements of every bulk memory application we have encountered," he added.

The memory is organized as 64K by 1 bit. Internal architecture divides the memory into 16 blocks of 4K bits each.

Typical data rate is 5 MHz, with average retrieval time for an average bit of 400 microsec. Power dissipation is less than 5 microwatts per bit in active mode and less than 1 microwatt in stand-by. The device is packaged in a standard .300-in. 16-pin DIP, he said.

Samples of the memory will be available in the second quarter for $96.61 from the firm's MOS/CCD Division, 464 Ellis St., Mountain View, Calif. 94042.

Flood Threat Causes User to Move CPU

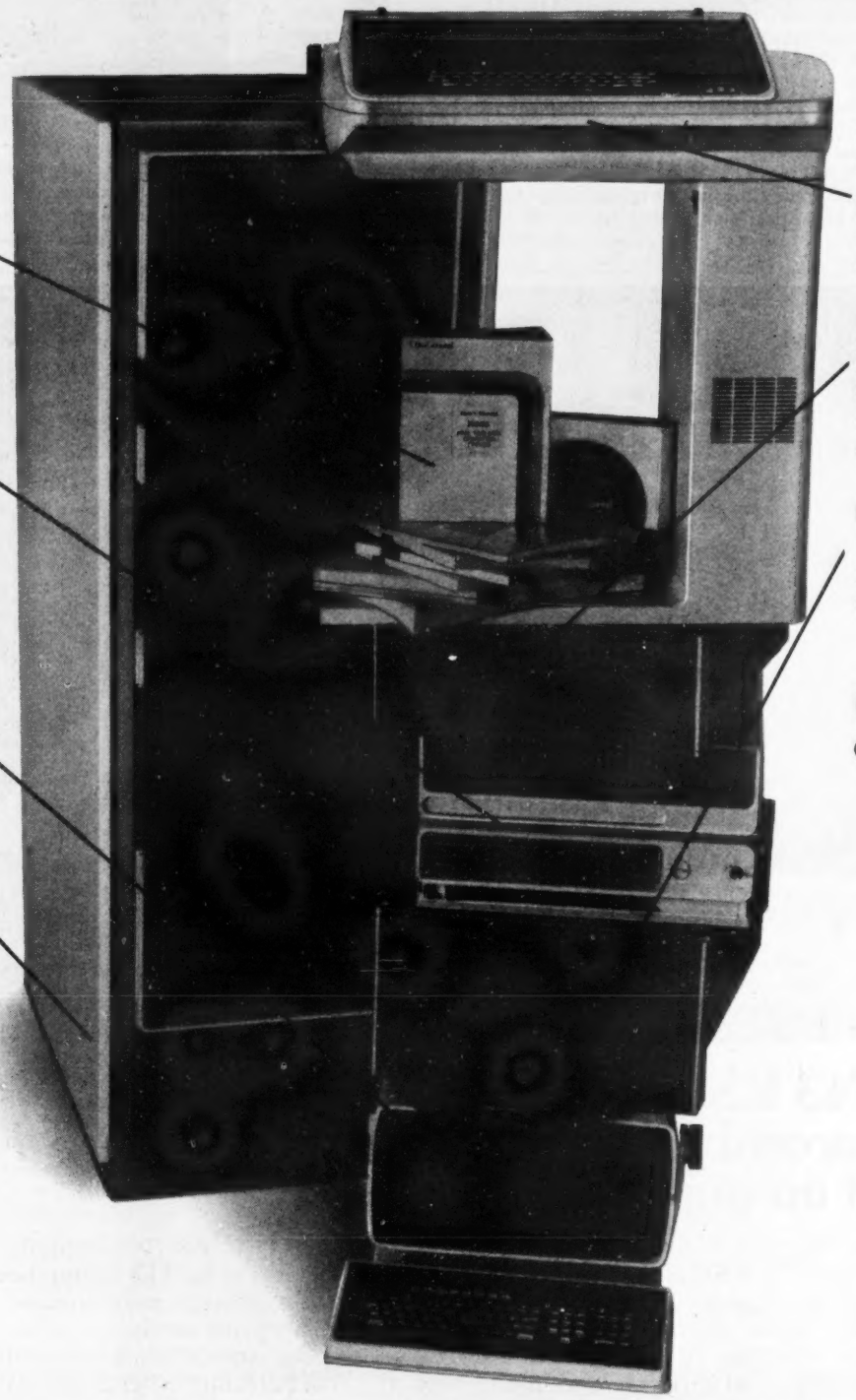
(Continued from Page 39)

gard to supplying power. We change something in the facility at least two or three times a year. We can finally grow and change with relative ease," Weaver said.

To meet the needs of the potential disaster, Computer Power Systems received the order from Weaver on a Friday and shipped the unit on Monday; Gateway was up and running a few days later, Weaver said.

A spokesman for the Weather Service here noted that the greatest danger is now over, but Gateway's move was probably a smart one because of the extremely short notice it would have received had a flood become imminent.

Here's how Data General's NOVA 3/D system stacks up against the competition.



Systems Software:
Multitasking real-time disc operating system, FORTRAN IV, Extended BASIC, ALGOL, SORT/MERGE, and Utilities.

NOVA 3/D Processor:
Hardware-protected dual partitions, 700-nanosecond arithmetic operations, 48K-word MOS memory with parity, RTC, and APL.

Video Display:
1920-character screen, upper/lower case characters, detached keyboard, numeric keypad, programmable function keys and character highlighting, display rotates on two axis.

Cabinet:
72-inch high, holds all rack mounted components.

DASHER Terminal Printer:
60/30 cps; 132-columns; typewriter keyboard, upper/lower case.

Diskette Subsystem:
315KB for program/data interchange, diagnostics and software distribution; convenient, industry-standard offline storage.

Cartridge Disc Subsystem:
10 megabytes (5 fixed, 5 removable); 50 ms. average access time, shares controller with diskette.

$37,610
List*

The facts speak for themselves. For $37,610, Data General's new NOVA 3/D gives you more system, software and support than any comparable computer. And we deliver in 60 days.

Any way you look at it, it all stacks up in your favor. For more information and our brochure, call or fill out and return the coupon.

*Quantity and OEM discounts available.

Data General, Westboro, MA 01581
Sounds like smart business. Send me more information.

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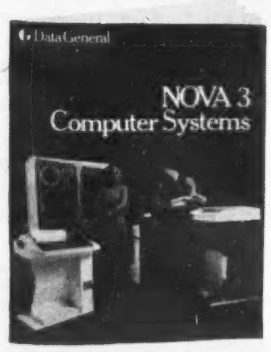

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In-House Printing of Fabric Tags Helps Apparel Maker Meet Law Efficiently

N. KANSAS CITY, Mo. — A men's clothing manufacturer here has combined modern forms technology with the speed of a line printer to efficiently comply with federal law concerning labeling of fabric content.

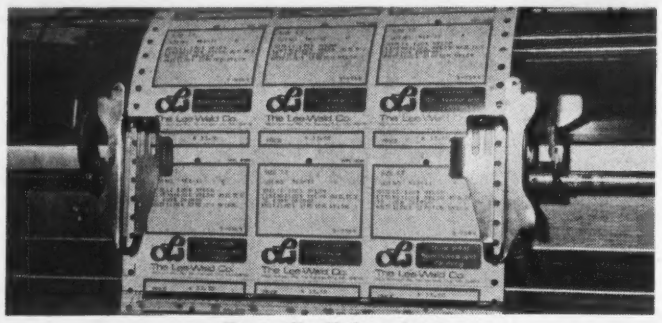
The Lee-Wald Co. is using Communicolor forms designed by the Standard Register Co. and a Univac 9200 with a 250 line/min printer to produce the federally required price/content tags.

Formerly, the fabric content tags were produced by an outside commercial printer, a spokesman said. This required that Lee-Wald supply the copy so the printer could prepare the plates to print the individual tickets.

Because the information changed frequently, printing runs had to be interrupted for plate changes, turning the process into a series of short press runs, he noted.

Consequently, the firm had to estimate the number of tags it would need to meet its sales. A high estimate wasted tickets and a low one required a rerun — both of which were expensive and wasteful.

The firm wanted better control and the ability to prepare the tags based on final and accurate sales figures. "The computer was the answer and the form is the medium," William Kay, Lee-Wald's vice-president, remarked.



Tags roll off the printer.

"We realized we could combine the content ticket with the one that carried size and lot number information.

"The operation was handled on our premises, but it was a slow procedure and by combining it on the computer with the other ticket, we could reap benefits in both applications."

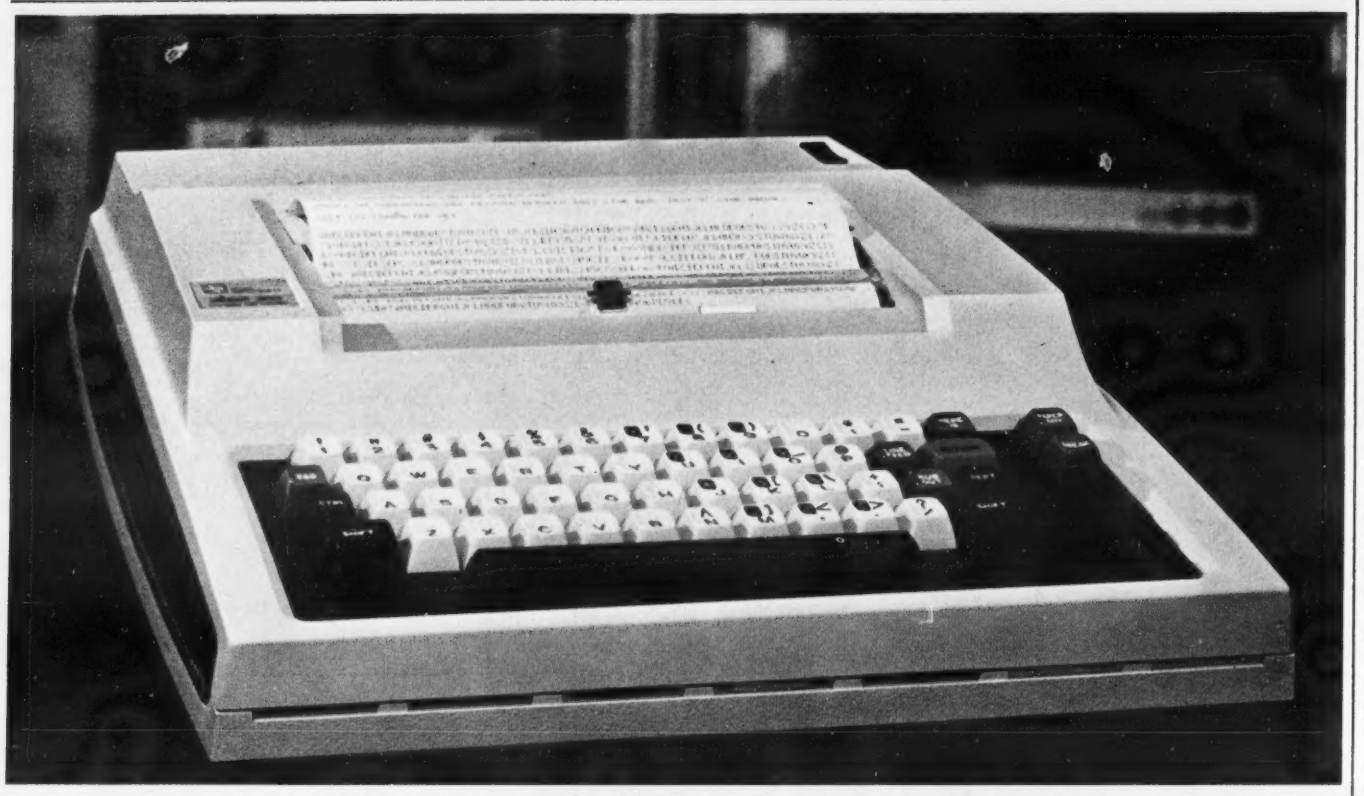
The document Lee-Wald now uses is a one-part form printed three forms wide on coated paper with a small die-cut hole top center. The main section carries the size and lot number information along with the description of the fabric content.

Immediately beneath that information is the Lee-Wald logo and address. The price information section can be separated from the other along a perforation.

Lee-Wald can now hold off preparing tickets until the last possible moment. The firm waits until the sales figures are final and the production run is then scheduled, the spokesman explained.

Where it formerly took several weeks for an outside printer to handle this job, Lee-Wald now covers a full season's production in a single day, he said.

"An attractive form, a simple system combine to save us time, money and aggravation. No waste, no shortages, just speed and accuracy. It all adds up to efficiency," Kay said.



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Versatec Offers Ink-Free Plotter

By Esther Surden
Of the CW Staff

SANTA CLARA, Calif. — Is your pen plotter slow and costly? Do the pens run out of ink and ruin the whole plot?

Have you thought about going to an electrostatic plotter, but dismissed that alternative because you can't find one wide enough for your application or those available won't work with your IBM 360/370 system?

Fear no more, according to a spokesman for a firm here that makes — you guessed it — electrostatic printers.

"Until recently electrostatic plotters were not wide enough to be very useful to the mainframe user," a spokesman for Versatec, Inc. said.

But this is no longer the case. Versatec now makes an electrostatic plotter up to 72-in. wide, he noted.

Electrostatic plotters are about half the cost of flat-bed plotters, he claimed, although special paper is needed to operate them and some attention must be paid to filling the systems with toner.

A recent software development effort — resulting in a device called a vector processor — has allowed the firm to offer software conversion facilities for mainframe users.

The vector processor takes the vectors of a pen plotter and translates them into rasters for the electrostatic system, he explained.

Mini Bits

Four-Phase Users Meeting To Plan Midwest Chapter

SKOKIE, Ill. — Users of Four-Phase Systems, Inc. machines will hold a daytime meeting here on April 14 as a first step in forming a Midwest Users Group to be affiliated with the National Four-Phase Users Association.

The location of the meeting will depend on the area that shows the greatest interest, according to Mary Jo Stabrowski, data entry manager at G.D. Searle & Co.

Interested users should contact Stabrowski at the firm, Box 1045, Skokie, Ill. 60076.

High-Speed Line Printer Designed by DEC for PDP-11

MAYNARD, Mass. — Digital Equipment Corp. has a high-speed line printer for its PDP-11 systems.

Designed for data centers and business applications, the LP14 is available in two models: a 64-character version that outputs 900 line/min and a 96-character model with 660 line/min output.

Features include a forms alignment guide, high-speed paper puller, adjustable paper shelf, static eliminator and ribbon deskew. The printer cabinet was engineered to minimize printer noise, DEC said.

The 64-character and 96-character versions are priced at $24,000 and $25,700 respectively. Deliveries of both in single units or as part of PDP-11 systems are scheduled for July from DEC in Maynard, Mass. 01754.

Tandberg Links Recorder, HP 21MX Minicomputer

SAN DIEGO — Tandberg Data, Inc. has linked its TDC 3000 digital cartridge recorder to the Hewlett-Packard Co. 21MX minicomputer, the firm said.

The interface uses two select codes and occupies one card slot in the 21MX. It connects to the recorder over a cable and data transfer takes place in either 8-bit or 16-bit parallel mode.

Packing and unpacking, if necessary, are handled by the interface, the company indicated.

The interface costs $1,500, a spokesman added from Suite 407, 4901 Morena Blvd., San Diego, Calif. 92117.

Correction

The price of the Custom Systems, Inc. Slot Saver multicontroller interface board for Data General Corp. minis [CW, March 7] is $1,250.

Upgrades Disk, Unbundles Software

HP Reconfigures 3000 Series II Models

By Esther Surden
Of the CW Staff

PALO ALTO, Calif. — Hewlett-Packard Co. has revised the configuration of the HP 3000 Series II system, upgrading the disk capacity and unbundling all software except basic operating software.

The company has also dropped the price of its add-on memory from $5,400 to $4,700 for a 64K-byte memory module, a spokesman noted.

The Series II now uses a 50M-byte disk drive developed by HP which is said to increase the systems' performance by up to 20%.

Formerly 3000 II systems were available in three models including varying amounts of software. "But we discovered our users didn't want or need all of the software bundled in," the spokesman stated.

Now users can get two 3000-II models, the Model 6 and Model 8. Both include the Multiprogramming Executive II operating system, HP's Systems Programming Language/3000 and a package of utilities for file copying, sorting, merging and text editing.

The net result of the revised configurations coupled with the disk storage is a system comparable to the three previously available systems at a slight decrease in cost, HP said.

For example, the former Model 7 with 192K bytes of memory, two 47M-byte disks, software for data base management, Cobol and RPG cost $150,000. A similar Model 6 configuration with 192K of memory and two 50M-byte disks, including the same software, costs $148,700.

The smaller Model 6 includes 128K bytes of memory, 50M bytes of disk, a 1,600 bit/in. tape drive, HP 2640B CRT console and a terminal controller. It can accommodate up to 256K bytes of memory and can handle up to 15 asynchronous terminals at up to 2,400 bit/sec.

Present Model 5 and 7 users can upgrade to the Model 8 configuration with the installation of an upgrade kit costing $25,000. The kit allows memory expansion beyond 256K or expansion of the available number of I/O slots, HP said.

The larger Model 8 is the same as the Model 6 but includes an additional bay for more memory and greater peripheral expansion, the company said. The basic Model 8 has 320K bytes of memory and is expandable to 512K byts.

Five Language Options

Users can optionally choose from five higher level programming languages for both systems — Cobol, RPG, Basic, Fortran IV and APL, according to HP.

Additional optional software includes the Keyed Sequential Access Method (Ksam/3000) and DBM/3000, which includes HP's Image/3000 data base management system and Query/3000 inquiry facility.

(Continued on Page 48)

Business Systems Can Be Built To Run Continuously: Tandem

By Esther Surden
Of the CW Staff

SAN FRANCISCO — "The need for entire businesses to go on-line is stimulating a requirement for inexpensive computer systems having continuous availability," James A. Katzman, vice-president of engineering for Tandem Computers, Inc. said in a paper presented at a conference here recently.

So the firm set out to design a multiprocessor system in which no single component failure could bring the system down.

The system also had to be able to be repaired without stopping and the operating system had to be designed to allow a program to continue to operate in spite of a hardware malfunction, Katzman said. The result was the Tandem 16 Nonstop system.

Traditionally, other systems had handled the requirement for continuous operation by using two processors with devices such as I/O channel switches and interprocessor communications adapters operating between the CPUs. While this eliminated the processor as a point of failure, it created new weakness areas and still did not solve the entire problem, he said.

Systems designed this way also shared memory, which could become another "single failure point," he pointed out.

Since communications between the CPUs is needed for checkpointing — letting a watcher program know where the running program is in its execution — losing the communications can cause the system to degenerate, he indicated.

A "double link" satisfies the problem of losing communications, but creates another: I/O bandwidth degradation, Katzman noted. "A drain of I/O capacity by checkpointing over the I/O bus restricts the number of terminals, disk files and transactions per second the system can manage."

Traditional systems also overlooked the problems of power supplies going down, cooling systems that are hard to maintain and replace and on-line maintenance.

Answer Not Perfect

Tandem's answer to the problem of the "nonstop" system is not perfect, but it does take care of most of the major difficulties in a price range businesses can afford, Katzman claimed. When asked what degree of availability his firm guaranteed, he flatly stated, "We don't guarantee anything."

But, he added, the company's own projections of its product's uptime have been very accurate in the 10 months since the system was first shipped.

(Continued on Page 48)

Memorex Adds OEM Disk Drive

SANTA CLARA, Calif. — Memorex Corp. has introduced a fixed media disk storage drive designed for small business systems.

The Memorex 601 is an OEM drive with capacities of 25M-, 50M- or 75M bytes. It can optionally provide 512K- or 1M bytes of fixed-head storage, the firm said.

The 601 has a data transfer rate of 885,000 byte/sec and an average access time of 32 msec, a spokesman added.

The drive uses a proximity recording technique, according to the spokesman. With this technique, low-mass and low-load heads operate in conjunction with disk surfaces on which a shield coating has been applied, he explained.

Because the heads contact the disk surface when not in rotation, the need for head loading and unloading mechanisms is eliminated, the company claimed.

A sealed drive module contains the drive's read/write heads, rotary actuator, spindle absolute filter and up to six data surfaces, depending on the particular storage capacity.

The 601 can operate in either a horizontal or vertical position and can be mounted in a standard 19-in. relay rack or housed in a 601 disk drive cabinet.

Memorex uses a rotary actuator which locates and maintains the track position. The actuator requires less power than a linear actuator, so generates less heat and has fewer moving parts, the spokesman said.

The data surfaces are coated and the surface shield increases output and resolution, Memorex said. The 100X coating surface shield extends the life of the disk over 100 times that of unshielded disks, it claimed.

Memorex did not disclose the drive's price, but said shipments are scheduled to begin in April. The company is at San Tomas at Central Expressway, Santa Clara, Calif. 95052.

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Intel Unveils Memory System for PDP-11; Gives Up to 128K Words of Added Storage

SUNNYVALE, Calif. — Intel Memory Systems has introduced its In-4011 add-on memory system for Digital Equipment Corp. PDP-11 minicomputers.

The semiconductor memory system stores 32K to 128K 18-bit words in a 7- by 19- by 17-in. unit and operates with cycle times of 650 nsec and access times of 500 nsec, according to the firm.

The interface is Unibus-compatible and includes parity error controls, the firm noted.

The basic card stores 32K of data plus parity bits in 4,096-bit random-access memory devices, a spokesman said.

Intel's base price is $4,560 for a 32K system. The system expands in 16K increments for as much as 50% less than the price of previous PDP-11 add-on memories, the vendor claimed.

For typical expansions of 64K and 128K words, total costs are $6,490 and $10,350, respectively, including parity generation and checking, integral parity registers, interface, cabling and all other equipment required to install the unit.

Delivery is 45 to 60 days from Intel Memory Systems, 1302 N. Mathilda Ave., Sunnyvale, Calif. 94086.

Hospitals Can Achieve 'Spectacular Results' With Shared Systems

By George G. Derry Jr.
Special to Computerworld

Although a trend toward in-house minicomputers for hospitals seems to be developing, users considering such a route should look into the possible cost savings with either time-sharing or shared systems within hospitals.

Each year many articles are written regarding unique DP solutions for hospitals.

Most of these articles deal with "spectacular results" that have been achieved by using computer X or software Y.

Shared Systems

As a consultant working within a certified public accounting firm that services the health industry, I believe some spectacular results can be obtained using shared computer systems.

It has been our firm's experience that hospitals sharing computer time can realize spectacular results and operate at a comparable or smaller cost per patient-day than their counterparts with in-house minicomputer installations.

Recently our firm completed a survey for a hospital to determine if its DP costs were reasonable.

When our survey was completed the findings were summarized as follows:

- In-house computer users were experiencing costs that ranged from $3 per patient-day to $6.71 per patient-day.
- Shared computer users were spending from $2.97 to $3.50 per patient-day for the same systems (labor included).

These results would vary with hospital size, occupancy rate and other variables. However, the conclusions would probably be the same.

"A shared computer hospital's cost will usually be in line with the most efficiently run in-house computer systems."

Cost, however, is not the only consideration when running a DP operation in a hospital. Increased revenue, reduction in late charges and decreased days in accounts receivable are the spectacular results obtained from good hospital systems.

When these results are in, shared systems deliver as well as their in-house counterparts.

Recent Conversion

One example of this was a recent conversion of a patient accounting system in a hospital from an electromechanical bookkeeping system.

Approximately $900,000 in added annual revenue was realized. Late charges were reduced, and accounts receivable collections went up substantially.

In this case, the annual cost of the system was returned six times in additional revenue.

Derry is the department head in charge of management advisory services for Gordon & Berg, Certified Public Accountants in Los Angeles, Calif.

PDP-11 Gets Reader Link

HOUSTON — A plug-compatible card reader interface for the Digital Equipment Corp. PDP-11 has been released by Information Products Systems, Inc. (IPS) here.

The CDR-101 is compatible with DOS/Batch-11, RSX-11, RSTS-E and all other PDP-11 operating systems, IPS said.

The CDR-101 sells for $3,200 from IPS at 6565 Rookin, Houston, Texas 77074.

Go ahead. Save the money. Design your own system.

There are a lot of very good hardware makers in this business.

Hardware makers who, in order to compete with that company with the three impressive, and expensive, initials, offer you more impressive, and less expensive cost/performance stories.

And one nagging worry.

The worry: if you pick a mainframe here, and an add-on memory there, and a West Coast printer, and an East Coast CRT, and an out-of-the-country plotter, who do you call when something goes wrong?

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Because when you talk with your various suppliers, you'll find that many of them have the same answer: you call SORBUS.

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From 8 to 1.6 Hours Daily

Small Business System Reduces Firm's Invoice Time

EMERYVILLE, Calif. — By switching from two accounting machines to a small business computer with a work station, H.S. Watson Co. has reduced its daily invoice input time from 8 to 1.6 hours.

H.S. Watson is a manufacturer and distributor of power transmissions and motor equipment for trucks, boats and pumping equipment. The firm services an international clientele through four branches and processes 400 invoices per day, as well as 40 to 100 checks.

The company began its thrust toward automation with an NCR accounting machine, then graduated to two Burroughs Corp. L5000 accounting machines.

"They were good machines, but were very limited when it came down to what we could do with them," according to Robert M. Herrara. "The machines were too slow to keep up with the volume of invoices.

"We had to keep a person on the Burroughs eight hours per day doing invoices only," he said.

"In addition," he continued, "equipment servicing and maintenance was not up to our needs. Our work is so critical and the workload is so high that if our system is down for only half a day, we're really stuck.

"Not only was the system too slow for us, but we could only obtain product code information on our reports quarterly, which wasn't frequent enough,"Herrara said.

An additional disadvantage with the old system was the absence of a check-writing capability because the Burroughs machine was tied up processing the 400-invoice load.

The firm considered Basic Four Corp. and Burroughs systems prior to going with a Wang Laboratories, Inc. small business system in October 1975. It chose the system because of its modularity, Herrera explained.

H.S. Watson purchased a Wang 16K WCS/30 small business computer, consisting of a CRT/typewriter console, with disk storage, high-speed printer and one workstation.

Now, with the WCS/30, "one person can input in one day what took four or five days before. A person could, if necessary, even process 1,600 invoices per day," Herrera said.

The system also allows the input of cash transactions and related reports for cash deposits. Deposit slips and a list of checks are now generated, enabling all checks to be deposited in the bank almost immediately.

Because of the enormity of the workload and because providing all vendor invoice payables and reports requires a large amount of print time, H.S. Watson decided to add a workstation to the WCS/30, Herrera said.

One person inputs information into the workstation essentially all day. In the morning, checks and associated information are input. During the remainder of the day, bank deposit slips are printed and worksheets and file information for accounts are handled.

At the same time, sales received, requried investments, payables and vendor invoice information are handled on the WCS/30 console, he stated.

"The two persons that operate the Wang computer," Herrera explained, "were trained in about one day."

"Because of the way our programs are written, along with the prompting CRT screen on the WCS/30 and workstation, if the need ever arises to replace either person, I'd look for a bookkeeper, not a computer operator."

All of the programs for the system were written in Basic by an in-house programmer. "We wanted a programmer within our own organization who could put our ideas and goals into proper perspective," Herrera explained. "We prefer this approach to purchasing standardized software.

"Although the end results of financial statements are similar in many companies, each business is unique in its detailed accounting process," he noted.

Some of the specialized accounting requirements handled by the system are financial management reports containing sales by customer, month, year-to-date, product code, dollar amount and gross product.

Accounts receivable, accounts payable, aging (120 days and older), inventory updates, general ledger, and management planning are also handled by the system.

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Systems Can Be Designed to Run Continuously

(Continued from Page 45)

The Tandem 16 Nonstop is a multiprocessor configuration of small-scale systems, each on a power level ranging between the Digital Equipment Corp. PDP-11/45 and PDP-11/70, Katzman said.

All controllers are dual-ported, power and cooling systems are redundant and interprocessor communication "is strongly connected with internal CPU link hardware logic."

The communications does not occur on the hardware channel, he noted.

Controllers are all connected to two channels to allow communications to an alternate CPU in case of a processor failure. Each controller is also redundantly powered by a current-sharing technique, and each has an individual power switch allowing it to be shut off without shutting off the power supplies, he said.

Power supplies are configured so that only the associated processor goes down, not the entire system. A fan in the cooling system can also fail and the system will still run.

The goal of on-line maintenance has also been achieved with the system, he claimed, with service reps usually isolating and replacing failed modules within an hour.

Program Problem

Another thorny problem attacked by the system was applications programming for these kinds of multiprocessor systems. "In the past, it was difficult for users to write applications programs for this," Katzman said, because all types of directions and handling had to be taken into account. Also, users couldn't expand without rewriting applications software, he claimed.

In the Tandem system, a copy of the operating system resides in each processor and only those I/O drivers required to support controllers attached to a given processor are resident.

All communications of a program to any device goes via a file access, which then passes the request to the message router. This achieves geographic independence of programs, he stated.

Weakest Point

The weakest hardware part of the Tandem system has proved to be the disk drives with other mechanical devices following, he replied to a question from the audience.

The Tandem 16 is not a "fail-safe" system, he emphasized, but rather one that tries to solve a problem from a different approach in a commercial environment.

"The people we deal with have tried to solve the problem using the state of the art as it existed before, and haven't been successful," he concluded.

HP Revises 3000 Series II

(Continued from Page 45)

DEL/3000, also available separately, provides the capability for interactive forms generation and collection and editing of data from a terminal during transaction processing, HP stated.

Both of the models support a synchronous communications interface for transmissions up to 9,600 bit/sec with software to emulate an IBM 2780/3780 remote job entry terminal, the company said.

Disk Drive

The HP 7920A 50M-byte disk drive has a maximum track-to-track seek time of 5 msec and an average access time of 25 msec. Up to eight of the drives can be attached to a Series II system, and the drive can be connected to the same controller used with the earlier 15M-byte drives, the firm said.

The drive can also be connected to other HP systems, it added.

The drive features higher reliability and better maintainability than the firm's previous 47M-byte drive, the spokesman claimed. This has allowed the company to reduce maintenance costs per drive by 59%, HP added.

Error Correction

The 7920A controller performs dynamic error correction, the firm said.

Additional disk memory for the Series II costs $14,000 for a single 50M-byte add-on drive and $26,000 for a pair. The basic Model 6 system costs $110,000 and the basic Model 8 costs $140,000.

Fortran, RPG, Basic and Cobol cost $4,500 each. APL costs $15,000.

DBM/3000, including Image and Query, costs $11,000 while Ksam/3000 is priced at $2,500 and DEL costs $1,500.

IAI Develops Turnkey For Use in Factories

WHITE PLAINS, N.Y. — Information Automation, Inc. (IAI) has introduced a factory data turnkey system which continuously monitors job performance, machines and operators, the firm said.

A terminal takes piece counts from machine sensors and transmits downtime and scrap data. The terminal also enables the operator to call for assistance and provides communication between foreman and crafts.

Summarizes Operations

Linked with a Digital Equipment Corp. PDP-11/04 and PDP-11/05 minicomputer, CRT display and printer, the system summarizes department and plant operations by the shift. Most plants average 100 to 150 operator stations at each plant. A terminal is located at each station.

Data is output for incentive pay, daywork analysis and inventory accounting.

Reports show reason and length of downtime and compare actual production with projections, the firm said.

The turnkey system costs $2,000 from IAI at 925 Westchester Ave., White Plains, N.Y. 10604.

Lomac Enhances Adam With IBM-Compatible Drive

SUNNYVALE, Calif. — Logical Machine Corp. (Lomac) has enhanced its Adam small business system with the addition of an optional IBM-compatible floppy disk drive.

The Disk/45 holds about 250,000 characters, equivalent to a box and a half of punched cards, the firm stated.

The drive costs "less than $3,000" and will be available in March from Lomac at 1294 Hammerwood Ave., Sunnyvale, Calif. 94086.

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Shadow II is a brand leader in the very tough European market. And it's quite definitely post-Dinosaur era.

The result of six years continuous development it has very specific advantages over its "pre-historic" competition.

For starters it takes just twenty minutes to install. As opposed to the days or weeks it takes to get one of its predecessors operational.

It is a genuine rather than pseudo multi-tasking, multi-threading system.

It has the most sophisticated Transaction Processing facility ever developed.

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Because it's so much easier to use its a great deal easier and quicker to train personnel to use it.

Shadow II uses a system called Shadow Telecommunication Access Method – STAM for short.

And STAM makes dear old BTAM quite obsolete. For starters STAM only uses about 10% of the storage required by IBM's BTAM.

The Shadow II support team also is somewhat unusual.

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With over 84,000 possible combinations for a product, a business needs some way to accurately keep track of inventory.

The small business systems at the Mellowes Co. in Milwaukee and at National Lock Washer in North Branch, N.J., are performing just such a function, according to J. Burton Bauman, general manager at National Lock Washer and participant in the Mellowes installation.

Both sister firms manufacture lock washers, available in more than 130 basic sizes. In each size, there are five industry-standard options of thickness and width and there are 13 materials from which to choose and 10 available finishes.

Packaging is yet another business control headache, Bauman said. Lock washers are available from the two firms in 50-pound cartons or in boxes containing 100, 500 or 1,000 units.

Most Logical Way

A small business system seemed the most logical way to go for the companies. Bauman looked at service bureaus and time-sharing and rejected these options because of cost, except for a specific application such as payroll.

But something was needed to upgrade from the old Singer billing machine, so the firms requested proposals from "15 or 20 sources and got back about five or six viable replies," Bauman said.

"We then visited them all, to make sure they understood our needs," he added. The field was narrowed down to Ultimacc from STC Systems, Inc. in Paramus, N.J. and a system from a Chicago company. The firms finally chose the Ultimacc system.

Together the firms carry active inventory listings of more than 1,500 items.

Major files in the systems are open order, customer master, product/inventory and raw materials. These files are linked to a range of supporting files, such as order items, "ship to" names and addresses, open accounts receivable items, customer part numbers and open purchase orders.

The systems treat quotations as a special type of open order, making it possible to transform a quotation of any size into an open order simply by changing the transaction type, Bauman explained.

In addition to its principal function, the order entry mechanism is also used to issue credits, for the interdepartmental transfer of materials and for the recording of special charges on the shipment of noninventory items.

Major Improvements

At National Lock Washer, Bauman reported that the advent of Ultimacc has resulted in an improvement in the speed, efficiency and accuracy of processing orders, issuing invoices and controlling inventory.

When National was using an invoicing machine, there were many time-consuming manual tasks to be performed, he said.

These included order editing (translating customers' part numbers and descriptions into National's own product nomenclature), order entry, followed by bursting and filing the 17-part forms, posting inventory changes and compiling shipping requirements.

Another major benefit has been accuracy. In the year before Ultimacc was installed, credits had doubled from the previous year, principally because of paperwork errors. Today, credits have virtually disappeared, Bauman said.

Bauman said he continues to look for new worlds to conquer with his Ultimacc. Currently, he is planning to move payroll processing (which is being done by a service bureau) onto his Ultimacc this year, he added.

"We have the time and the trained personnel, so we are confident we can handle payroll in house," he said.

Mellowes is expected to take the same step this year.

BC/7 Seen Beginning Univac Product Line

CHERRY HILL, N.J. — The Univac BC/7 is expected to be only the "first model of a new product line which will probably include a BC/8 and a BC/9, and even larger models," according to an article in this month's issue of *Small Business Computer News*.

"The Univac BC/7 does have strengths over the (IBM) System 32," the article stated. These strengths include multiple terminal capability, concurrent data entry with application program execution, the Escort business user language and removable disks with a larger storage capacity.

The system also has an RPG-II program language similar to that of the System 32, is in its price range and can use the IBM 3740 data entry system for off-line data entry via diskettes, the analysis continued.

The BC/7's weakest points are its inability to perform multiple application programs, limited number of workstations, present product size, limited data communications capability, single product offering and entirely new sales force, the article stated.

Small Business Computer News is available from Management Information Corp. at 140 Barclay Center, Cherry Hill, N.J. 08034.

Wang Minis Get Time-of-Day Clock

OAKLAND, Calif. — Fluidyne Instrumentation has introduced a time-of-day clock for the Wang Laboratories, Inc. 2200 series minicomputer.

Called the 7230A, the unit is panel-mounted and displays seconds, minutes and hours, the firm said.

The clock can be set at any time from front-panel pushbutton controls, according to a spokesman. Two buttons must be pressed simultaneously to prevent accidental alteration of the clock's value.

The clock is useful for applications such as production monitoring or on-line data acquisition, he noted. It interfaces to the Wang system via a 2252 or 2252A I/O controller card provided by Wang.

The 7230A costs $750 from the firm at 1631 San Pablo Ave., Oakland, Calif. 94612.

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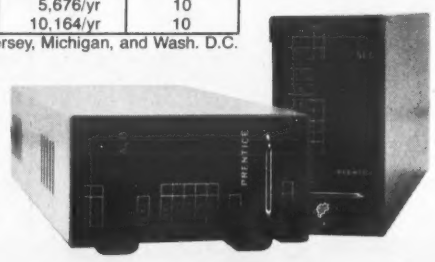

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GRI Adds System 99 Printers

NEWTON, Mass. — GRI Computer Corp. has added two line printers to the printer options available for its System 99 small business system.

The Model 9325 is a 250 line/min printer with a 64-character Ascii font; the Model 9326 operates at 180 line/min with a 96-character font.

Both use a 132-column print format, the firm said.

The printers feature changeable print-belt characters. Adaptive control logic allows the printers to monitor each print line and adjust for maximum speeds based on character content, the company added.

The units also feature a paper status detection alarm to notify the operator to load forms or check for paper jams. They use standard pin-fed continuous forms and industry-standard IBM 1403-type ribbons, GRI said.

The Model 9325 costs $9,575 and the Model 9326 costs $9,800. GRI is at 870 Georges Road, North Brunswick, N.J. 08902.

TI 990 Family Users Offered Software Development Systems

HOUSTON — Texas Instruments, Inc. has introduced two floppy disk-based software development systems for users of the 990 mini/microcomputer family.

The systems, designated FS990/4 and FS990/10, support development, testing and maintenance of applications programs, the company said.

Software and Firmware

Both include the capability for software and firmware development for the TMS 9900 microprocessor unit, the 990/4 microcomputer and the 990/10- minicomputer, TI said, adding the differences between the two systems are the processors and 8K of memory.

The FS 990/10 includes the 990/10 mini with 32K 16-bit words of memory with parity, dual floppy disks with 48K bytes of storage and a Model 913 CRT terminal, according to the company.

Printer options include TI's 700 Series models 743 keyboard send/receive and 733 automatic send/receive data terminals and the TI models 306 and 588 multicopy printers.

System software includes the TX990 executive operating system and TXDS development utilities. TXDS utilities include a two-pass assembler, interactive source text editor, two-pass link editor, stand-alone debug monitor and assorted general utilities, the company said.

Modular Executive

The TX990 executive reportedly provides operating system support for TXDS development utilities and offers the 990 user a modular multitasking real-time executive with floppy disk file management utilities.

Also included with the TX990 executive are linkable modular components to support custom system generation for any target 990 computer system, TI added.

Included with either system is the TX990/TXDS license, a one-year software revision subscription service, a user's guide and programming manuals, the company stated.

System Options

Additional systems options include the programmable read-only memory programming unit and the Model 804 card reader, TI said.

The FS990/4 incorporates all the features of the 990/10 but has the 990/4 micro with 16K words of memory.

Prices for the FS990/4 system begin at $10,500, while the price of an FS990/10 starts at $13,500. They will be available in April from TI's Digital Systems Division, located at M/S 784, P.O. Box 1444, Houston, Texas 77001.

IDT Video Generator Designed for PDP-11 Features Eight Colors

COLUMBUS, Ohio — A graphics video generator designed specifically for use with Digital Equipment Corp. PDP-11 minicomputers is available from Industrial Data Terminals Corp. (IDT).

The IDT-11 is configured as two quad-sized boards which plug directly into a DD-11 backplane and operate at main memory speed, the firm said. The generator features standard Ascii alphanumerics, paint-up and paint-down bar graphics, reverse video, blink and microprogrammable symbol graphics.

IDT-11

Foreground/Background

Individual foreground/background selection in any one of eight colors is made on a character-by-character basis, the company noted.

The system comes with software to aid in applications development as well as program listings, sample displays and a user manual.

The IDT-11 costs $3,100 with quantity discounts available, IDT said from Suite 176E, 1550 W. Henderson Road, Columbus, Ohio 43220.

Chassis Lets PDP-11 Use WP Controllers

ANAHEIM, Calif. — Western Peripherals, Inc. (WP) is offering the WP-919 external adapter chassis to Digital Equipment Corp. PDP-11 users for use with its TC-130 magnetic tape controllers and DC-230 disk drive controllers.

The chassis was primarily designed for users who prefer to mount controllers for tape and disk drives outside the computer, a spokesman explained.

Optional Cabinet

The optional external cabinet accommodates WP or DEC hex and quad peripheral controllers. The WP-919 will accept two TC-130 tape controllers or one WP tape controller and one DC-230 disk controller, according to the firm.

The unit is 5-1/4-in. high and 16 in. deep, with standard rack-mounting width. It has a standard 5V and 15V DEC-compatible power and holds up to nine hex boards, the firm said.

Fan-forced air cooling is provided for both the power supply and printed circuit boards.

The chassis costs $650 from WP at 1100 Claudina Place, Anaheim, Calif. 92805.

Microdata, Dealers, OEMs Disagree

Nonappearance of Express System Causes Dissension

By Toni Wiseman
Of the CW Staff

The relationship between a manufacturer and an OEM is a strange one at best, fraught with hazards on both sides. In some cases, these hazards grow from mere inconveniences to severe financial losses.

What is the manufacturer's obligation to deliver a system as it is first conceived?

Should an OEM invest time and money in developing a market and software for a product before it is a tangible entity?

Who is liable if the system never appears or appears in a more limited version, thereby destroying the market "built" specifically around its capabilities?

These are some of the questions, as yet unanswered, in the controversy surrounding Microdata Corp. and its Express system — or, one might better say, its "proposed" Express system since it has yet to appear "in the iron." The source of the problem is somewhat obscured as there is no consensus on many of the facts. However, one opinion is unanimous — Microdata made a serious miscalculation on development times.

All parties agree that Express, when it finally appears, will not include all the hardware capabilities initially promised by Microdata.

Microdata, however, indicated Express will eventually include all capabilities but, because of schedule slippage and in order to prevent end user problems, the system will at first be limited.

The Microdata Dealers Association felt the manufacturer did not realize all the implications of dealer/OEM and Reality/Express situations with regard to price, performance and markets.

Some OEMs indicated they are now faced with applications software, based on preliminary OS coding, and a market for which there is no system.

At last year's National Computer Conference (NCC), Microdata announced Express, which was effectively a logical upward growth of what the firm had already been marketing for several years.

The system would have the same stack-oriented architecture as Microdata's 32/S, the same 3200 CPU and would take Microdata's block-structured generator language — MPL — and upgrade it to a new language known as EPL, Microdata claimed.

EPL was said to be a relatively close, useful, structured subset of PL/1.

Express would also have a new operating system — Express Multiuser Operating System (Emos) — which was to be a segmented virtual operating system with very high-level file capabilities.

The system was also to have a new disk drive and a tape drive associated with it; the disk to be based on Winchester technology.

Express was to be an OEM system, sold directly to that market.

Industry-Shaking Prices

By going the microcoding route in a stack architecture machine, and packaging it with an extremely high-density disk and tape technology, Microdata released prices in industry publications that were industry-shaking — quantity one prices below $20,000 for a 32K-word system.

The announcement essentially represented the bringing of the state of the art, of both hardware and software, in its commercial expression from large mainframes to the mini area, and at a price that "beat the pants off 11/34s and anything else around that is any good," according to an OEM.

Today, however, nine months after the first announcement and three months after scheduled availability, Express is still nowhere to be seen.

Microdata is officially saying the system will be available in August or September, but with greatly reduced hardware capabilities.

In fact, in one OEM's estimation — one the president of the Microdata Dealer's Association could not disagree with — Express will be about half the system for twice

(Continued on Page 57)

Analysis

Brokerage Firm Predicts

IBM to Enhance Mid-Life 370s to Foil PCM Growth

By Toni Wiseman
Of the CW Staff

NEW YORK — IBM will attempt to stunt the growth of plug-compatible manufacturers (PCM) by enhancing mid-life System 370 equipment and unbundling some of the software or resorting to a microcode strategy, according to a report by L.F. Rothschild (LFR), a brokerage firm here.

LFR further expects IBM to attempt a final solution to the PCM challenge by introducing a new computer line at the end of the decade, along with a new set of hardware/software economics.

"We speculate that the economies realized on the new equipment may offer a much greater incentive to purchase IBM's CPU equipment than is currently the case," the report noted.

"Limiting earnings exposure through less reliance on a rental base will allow the company to offer more rapid price/performance technology advances, which would encourage competitive displacement of IBM's machines," it added.

Higher Profit Percentage

LFR predicted that, eventually, a higher percentage of profitability will be built into IBM's service, education and software operations, where competition is currently very limited, enabling IBM to position its equipment pricing for an optimum competitive impact.

"In essence, this form of computer economics already exists in today's minicomputer industry. Hence, we might expect that the business strategies employed in the mainframe sector of the industry will evolve to more closely resemble those currently being practiced in the minicomputer field," LFR indicated.

The report suggested several countermoves IBM could make against PCMs, including a microcode strategy and unbundling the system control program.

IBM could take some or all of the instructions now included in the Systems Control

(Continued on Page 52)

Burroughs Executives Sued

NEW YORK — A $500 million suit has been filed here charging the chairman, president and senior vice-president of Burroughs Corp. with hiding inside information from stockholders until such time as the executives could dispose of substantial amounts of stock.

The defendants are Ray MacDonald, chairman; Paul S. Mirabito, president; and Donald Young, senior vice-president. Other officers are expected to be named in the suit at a future date.

"The shares of stock referred to in the suit were shares obtained by the officers of Burroughs through the exercise of stock options granted to them as part of their compensation and sold by them during 1976 for personal and income tax reasons," according to a Burroughs spokesman.

"These officers believe that there is no basis for any of the allegations and if, and when, any such suit is commenced against them they intend to resist it," he said, adding the Burroughs executives had not been served with any papers at that time.

The suit charged that, as a result of alleged misleading statements issued concerning the company's prospects, and as a result of the officers' sale of stock, shareholders had lost about $500 million.

In addition, the suit alleged the defendants, being aware of the company's true prospects, kept that information confidential during November and December, during which time they disposed of 54,400 shares of stock and realized a $1 million profit.

The suit charges that if the unfavorable information had been divulged, the price of Burroughs' stock would have dipped significantly, an event which did in fact occur when the news was revealed.

Burroughs' stock fell from $86 to $92 in December to $68.25 in January.

The suit, brought by a stockholder, asks that the defendants be directed to return the $1 million to the company and, in addition, be held liable for any suits which may be brought against Burroughs, in amounts up to $500 million, by stockholders who purchased stock because of false impressions caused by misleading statements.

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IBM Seen Foiling PCM Growth With Enhancements for 370s

(Continued from Page 51)

Program and put them in microcode, which could not be easily handled by a PCM machine, the report indicated.

Amdahl Corp., for instance, would have to develop its own internal microcode instructions for the 470V/6 if IBM made this change in the operating system, it noted.

"Since hardware technology is advancing so rapidly, we do not think that IBM's adoption of a microcode-only approach would represent a practical long-range solution to competitive pressure," LFR stated.

The report added there is evidence IBM development of a microcoded control program that would be extremely difficult to copy is underway.

"It should also be noted that it would be costlier to maintain the System Control Program in microcode form than to use regular software, as there are constant changes taking place," it said.

An alternative move for IBM would be to unbundle selectable units of newer versions of the operating system, the firm noted.

"The general theory behind unbundling the System Control Program is that IBM would transfer a portion of its revenues and profits to this software area, making either better price/performance equipment or lower prices available, thereby cutting the margins of the [PCMs] and restricting the business opportunities," the report stated.

"Obviously, IBM cannot devote all of its profits to its software, leaving a minimal equipment profit for itself and others in the field, because, as a dominant force in the marketplace, it would be accused of predatory pricing.

"Also, this practice would establish a software price umbrella, fostering new competition," LFR said.

The Wall Street firm concluded that unbundling would not be effective in the long run.

LFR expressed the belief that there are only two practical long-term IBM responses to the PCM onslaught.

"It is quite possible that IBM will try to separate the selectable units in the system control category into microcode and software, making it more difficult for competitors to copy the CPU's internals, in tandem with instituting a separate charge for software.

"This would lower the margins available to plug-compatible competitors, which would be forced to drop prices to compensate the user for the extra cost of IBM software while facing increased expenses arising from constant IBM hardware microcode changes," the report suggested.

Alternately, IBM could institute a restrictive pricing policy on software not being used in conjunction with an IBM CPU. This, however, would raise the question of tie-in sales as well as legal issues, the report said.

FTC Formalizes Ban On Shared Directors

WASHINGTON, D.C. — The Federal Trade Commission (FTC) has formally accepted its previously approved consent order preventing IBM from having interlocking directors with competitors.

The regulatory agency fashioned the order last Nov. 10 in response to its complaint that two IBM directors also served on the board of New York Telephone.

The order, which prohibits any individual from serving simultaneously on the board of IBM and New York Telephone, AT&T or any other AT&T subsidiary as long as the two corporations compete in any area, was adopted by a unanimous vote of the commissioners following a period for public comment.

As with all such orders, this agreement between the FTC and IBM now carries the force of law and if violated demands up to $10,000 in civil penalties per incident. For settlement purposes only, the order does not constitute an admission of guilt on IBM's part.

Utility Packages

A special report in the April 25th *Computerworld*.

Whether you're sorting, spooling, writing, reporting, managing, maintaining, securing, capturing, manipulating or preparing data — you've probably used (or thought about using) one of the multitude of utility packages currently available.

Computerworld's April 25th special report, edited by Don Leavitt, will take a close look at the selection and use of these packages — with tutorials, user experiences and commentary on topics like these:

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Telenet Sees 250 Packet-Switched Users by Year-End

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. — Telenet hopes to have 250 users on its packet-switched communications network by this end of the year, according to its vice-president for planning.

The company already has 115 "subscribers" or "host computers" linked to its system and expects to continue to grow at a rate of 12 new users each month, Stuart Mathison told the Fourth Annual Caucus of the Computer & Communications Industry Association (CCIA) here recently.

This growth is also reflected in Telenet's plans to announce rates soon for permanent virtual connection — the packet-switched equivalent of leased or private lines — and to go from 76 access nodes in the U.S. to 85 in the next few months, Mathison said.

In addition, the company will also respond to technological advances by converting those nodes over the next 18 months from multiplexers to microprocessor-based concentrators, he stated.

Foreign Service Slated

Before too much longer, Telenet hopes to offer foreign services to its users as well. Mathison told the CCIA's member organizations that within the last two weeks the firm filed a tariff application to provide service to Mexico.

Prior to coming to the association meeting, Mathison met with people from Canada's packet-switched telecommunications system, Datapac, to discuss its interconnection with Telenet.

The company vice-president predicted the industry will see an extremely rapid development of packet switching for overseas communications in the next year — primarily because it makes such efficient use of channel communications. The Federal Communications Commission recently approved Telenet's applications to get into this business, Mathison added, noting the firm will do so in conjunction with RCA Global Communications.

Telenet's seven major switching centers with 56 kbit/sec Bell System Dataphone Digital Service lines now serve 53 commercial computer service firms, 47 corporations, 12 colleges and universities and three government agencies, Mathison said. Atlanta will soon be upgraded to a major switching center, bringing that total to eight.

The firm anticipates continued user growth, in part, because of the price advantage it offers — chiefly over AT&T. The permanent virtual connection it expects to make available shortly "will cost a few hundred dollars instead of the few thousand that leased lines cost each month," Mathison stated.

The economics of a packet-switched telecommunications system are "extremely attractive" to companies with interactive or transaction data that is of a "bursty" nature, he explained. If a user's requirements demand that he send data continuously, he is better off with a leased line, Mathison added.

Whether a user chooses to use Telenet's multiple or single connection ports, his only costs when not sending data are the expense of the port and the access line at each end, he said.

Hosts Run the Gamut

Most Telenet users tend to be concentrated near Telenet sales offices, Mathison noted. The host computers linked to the network run from Amdahl Corp. 470V/6s to all types of minicomputers, he said, adding there are many IBM 370/155s and Digital Equipment Corp. Decsystem-10s and PDP-11/45s now using Telenet for "virtual calls" — the packet-switched version of circuit-switched communications.

Telenet provides its computer service users with the additional service of a list of those bureaus on the network. Corporations using Telenet for private communications are not publicized in this way, Mathison said.

Some of the firm's users, like American Can and Raytheon, sell their excess computer capacity through the packet-switched network, he stated.

The small service bureau uses Telenet because the network has the effect of providing it with regional service bureaus; the larger bureau is able to market its services over a wider geographic area, the vice-president said.

For all users, the rationale for using the network ranges from the facts that charges are based on usage and that the system can handle unpredictable traffic loads to the need to employ a wide variety of terminal types and to access multiple computer locations, Mathison added.

In discussing his firm's plans to extend its service abroad and its packet-switched counterparts in and outside the U.S., Mathison expressed Telenet's support for the standard packet-mode interface known as X.25 which was developed by the Consultative Committee on International Telephone and Telegraph (CCITT), the international telecommunications standards-making body.

Intended to be a device-independent interface to a public packet-switched network, X.25 will be used as the basis for the interconnection between Telenet and Canada's Datapac, Mathison said.

Telenet already has an interface which it claims is the functional equivalent of X.25, thus affording the user a means of connecting programmable devices to one another — be they full-fledged host computers or intelligent terminals or concentrators.

Between 25 and 30 of Telenet's current 115 subscribers employ this interface, which is a synchronous protocol for providing multiple connection on a single synchronous access line, he explained.

Using this interface, the network works "like one giant remote concentrator; the host computer is effectively connected to these points through logical or virtual channels," Mathison explained.

The interface permits a wide variety of programmable devices to connect to the packet-switched network efficiently, he added. It provides a single high-speed path anywhere from 9,600 bit/sec to 56 kbit/sec, a dynamic allocation of the network to all users and better response times measured in milliseconds as opposed to seconds, Mathison stated.

Telenet's other 70 to 75 users went with a less efficient interface that would accommodate the communications software and equipment they had when the telecommunications firm started operations a year and a half ago.

Emphasizing that X.25 is now an international standard, Mathison predicted that from the user and long-term viewpoints this standard interface could become "the RS-232 of 1980."

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Sees '77 Best Year Yet

Incoterm Targets Vertical Applications

By John P. Hebert
Of the CW Staff

WELLESLEY HILLS, Mass. — Because Incoterm Corp. here offers a vertically integrated series of products, it is situated squarely in the path of the untapped 90% of applications for intelligent terminals, according to M.R. Clement, vice-president of corporate business and product planning.

Incoterm started out as a privately held company in 1969 and, by concentrating on the evolution of its standard product, it has offered users a better product, Clement and Sam Adams, vice-president of marketing, said.

The company's success in never experiencing an unprofitable year results from taking a basic device, modifying it to make new product lines and customizing it for each individual user, Clement said.

Incoterm expects the 1977 fiscal year to be the most profitable yet, with nine-month revenues of $27 million exceeding the 1976 level by more than $3 million, according to Adams.

Variations on Theme

The company's first intelligent terminal series, a stand-alone programmable device with 2K of memory, was aimed at the expanding airlines passenger reservation application area in 1969, 1970 and 1971, Adams said.

From there the company came out with a more powerful variation on its basic theme with a 4K-processor CRT, Adams said, adding it was about this time the company decided "to take all its eggs out of one basket" and searched for new applications areas.

The product evolution led to the second half of Incoterm's product line of intelligent devices which incorporated a clustered approach to DP because of the demands for increased user inquiry to large central data files from remote points.

The approach is reflected in the minicomputer-based SPD-20/20 CRT controller, which allowed reduced size in the clustered terminals with which the device communicated.

The move to other applications areas helped Incoterm make it through the 1974 recession and oil embargo which affected airlines, Adams noted.

In 1973, the company moved its headquarters to its site here and went public.

By 1974, Incoterm had already spread out over a host of other industries and only 36% to 37% of its products were used to access large airline data bases, Adams said.

The company then evolved another version of the standard product, a factory data collection device, the Incomate, which shared the SPD-20/20 product approach and strategy, he said.

Today, about 14% of Incoterm's efforts are devoted to the airline environment, while 22% is aimed at the banking area and the remaining 63% is spread out over other industries, he added.

Focus on Banking

This "major penetration" into the banking business, Adams said, has occurred in the last two years when Incoterm again expanded its basic terminals to include the Series 7000 on-line banking system.

The system allows teller access to bank customer information files contained in a bank's CPU from CRTs and peripherals to the intelligent devices.

The banking system was expanded last year to include in-lobby automated teller terminals as well as a wall-mounted version for customer banking after office hours, Adams noted.

Another secret of Incoterm's success is fully supported software for the product line, which includes over 400 user programs, allowing the devices to communicate with other vendors' computer systems he said.

Incoterm now has a $1 million line of revolving credit and is presently in debt for $5 million, which Adams said "is none to speak of."

The company has 32,000 units installed in 38 countries. It is presently trying to expand its applications areas again by getting into the government marketing sector by arranging for General Services Administration contract proposals, Adams said.

HP Develops CMOS/SOS Micro

CUPERTINO, Calif. — Hewlett-Packard Co. has developed a static 16-bit parallel microprocessor with instruction speeds of .5- to 1.5 microsec and a power consumption of 400 mW based on complementary metal oxide semiconductor/silicon on sapphire (CMOS/SOS) technology, according to a technical paper delivered by HP engineer Lam-Giang Dang.

The device described by Dang is optimized for controller applications and features asynchronous memory and I/O operation. The chip has about 10,000 transistors in 34 square millimeters.

HP's CMOS/SOS lab is three years old, but this was the first public announcement of developments being made there, the firm acknowledged.

Executive Corner

- Louis H. Benzig has been elected to the board of directors of Decision Data Computer Corp. to replace Loren A. Schultz, who resigned.
- Steven R. Gerbsman has been appointed president of the Network Communications Division of Itel Corp.'s Data Services Group.
- Ronald O. Huch has been named president and chief executive officer of Dataroyal, Inc.
- John T. Kohler has been promoted to director of consulting services for Consumer Systems Corp.
- J.M. Tate, formerly president of B-H Computer, was promoted to vice-president of marketing for the professional group at Pace Resources, Inc., its parent company. Robert L. Leiphart was named president of B-H Computer.
- Lee Falco Jr. has been named vice-president and general manager of the Data Products Group of Lear Siegler, Inc.'s Electronic Instrumentation Division.
- Geza E. Gorgenyi has been named vice-president of operations for Educational Data Systems, Inc.
- Jack L. Vandervest has joined Escom/Oregon as marketing director.
- Kenneth E. Wortz has been named vice-president of Data Dimensions, Inc.'s Equipment Division.
- Robert G. Walden has been appointed senior vice-president of finance and administration, a new position, at Logicon, Inc.
- James Perotte has been named vice-president and general manager of Magretech, a division of Magnetic Recovery Technologists, Inc.

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The Washington Metropolitan Area Transit Authority intends to procure an Automated Information Directory System (AIDS) for use in the distribution to the public of information concerning Metrorail and Metrobus operations.
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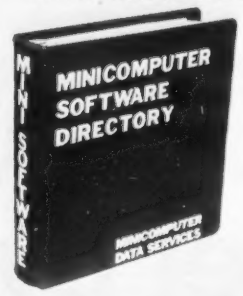

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Five Crucial Factors Cited for OEM Selection of Mini

IRVINE, Calif. — For the OEM, five main features are of utmost importance in selecting a minicomputer: cost, compatibility, reliability, availability and capability, according to David Coulson, sales support analyst for Computer Automation, Inc. (CA).

In terms of cost, the OEM has to consider not only what he pays the vendor, but also the hidden costs he accrues, such as front-end design costs and maintenance costs, Coulson noted.

He should consider total systems cost — CPU, memory, I/O controllers, chassis, power supply, control console and software charges. By taking advantage of advanced techniques, such as CA's Distributed I/O system, the overall system cost can be reduced, he suggested.

The OEM must also look for a vendor who offers a full range of machines with total compatibility of hardware and software throughout the entire line. This will allow him to configure his system to suit the needs of both small and large users, for instance, without having to redesign his software or interfaces, he said.

Reliability is of very high importance to the OEM since his reputation depends upon it. If the minicomputer he incorporates into his system goes down, he is the one who looks bad since he was responsible for the choice of that machine, Coulson pointed out.

The OEM should examine carefully the factory test procedures used by the mini supplier, he said. A minicomputer which has survived a rigorous series of burn-in, temperature cycling, shock and vibration tests is much more likely to give years of trouble-free operation, since early-life failures will occur in the factory.

The OEM should therefore look for some measure of security, such as a one-year warranty, he said.

While an end user may be able to accept a six- or nine-month lead time without undue inconvenience, the OEM cannot. He expects off-the-shelf delivery since he cannot project his orders as far out into the future as some vendors' delivery times require, Coulson noted, adding the OEM treats a minicomputer as a component and expects to find it in stock when he needs it.

Questions on Capability

Finally, in the area of both hardware and software capability, Coulson said such items as the power of the computer should be evaluated. The instruction execution time, size of instruction set and number of addressing modes should all be factored together to provide a measure of computer power.

What is the range of memory types? Are core, random-access memory, read-only memory, programmable read-only memory and erasable programmable read-only memory available on all machines in the range? Can memory types be intermixed? Is there flexibility in packaging? Can the OEM order a "naked" CPU, memory on a single card or a complete packaged system to suit his exact requirements? Coulson asked.

What about I/O capabilities? What alternatives are available to allow the OEM to make optimum trade-offs between software and hardware capabilities? Is high-speed DMA available? Can he purchase I/O controllers without peripherals?

The OEM usually wishes to choose his own peripherals and negotiate a price directly with the peripheral supplier, he said.

Minicomputer manufacturers who supply both OEMs and end users produce machines which are a compromise between the needs of each marketplace. The OEM should therefore deal with an OEM specialist if he wants fast delivery at minimum cost for a highly reliable product, Coulson suggested.

Express System Discrepancy Causes Dissension

(Continued from Page 51)

the price, nine months after the date it was due.

In an interview, Microdata's President Donald Fuller stated emphatically that Express is still OK as originally conceived, "it's just that at this stage of the game we're retrenching somewhat in terms of what we think we can do this calendar year."

Why the discrepancy between the announced Express and the one which will be delivered in the third quarter? Because of internal upheavals and dealer "blackmail," according to an OEM who asked not to be named as there is the possibility of litigation in this case.

Fuller blamed over-optimistic development and production schedules.

Microdata has recently gone through a series of large personnel layoffs. Industry estimates are that about 300 people have left in the last few months.

Among these were the vice-presidents responsible for design of Emos and the disk controller, the OEM charged.

Fuller, however, denied that any executives in charge of Express development programs have been terminated.

Whatever the cause, there is no argument that Emos is far behind schedule. Due to go into Alpha testing in December 1976, it is only now reaching that stage. No significant deliveries are expected until August, Fuller indicated.

Unique Dealer Arrangement

The OEM was more concerned with the role he alleged the dealers played in raising the system's price.

Microdata's arrangement with its Reality dealers is rather unique in the industry; they have exclusive capability to sell Reality in a geographic area and are constrained not to sell any other system.

The announcement of Express, a far more powerful and versatile machine, at least on paper, gave the distributors a nasty jolt since they were initially constrained so they could not sell it, both the OEM and Ted Sabarese, president of the dealers' association, agreed.

There is no question the dealers and Microdata's top management have met frequently since NCC. The matters discussed and the outcome are points of disagreement.

A Form of Blackmail

The end result, according to the OEM, was a form of blackmail where dealers said: Unless you sell this system for a lot more money and all sales, and incidentally all commissions, go through us, we won't sell Reality.

No one can blame the dealers, he said. They wanted to lessen competition with Reality as well as increase their profits.

A basic Reality costs about $50,000; if a more powerful machine — Express — sold for $20,000, they stood to lose a lot of business from Reality to OEMs who could undercut them.

Sabarese conceded there was a point in time when the dealers were not able to sell Express, "but that has all been settled now."

The price increase, however, is not a result of any demands or efforts by the dealers, he emphasized, speculating that Microdata had underestimated development and manufacturing costs.

Asked whether he agreed that Express would finally appear as "half the system at twice the price," Sabarese said that was the case "in a limited sense," noting, as Fuller did, that all features would eventually be available.

He said the meetings were held because the dealers felt Fuller "did not fully understand some of the implications" of the situation in which dealers were constrained from selling Express. The dealers did not want Express to knock Reality out of a deal, he said.

"After running through some problematic situations, [Fuller] realized that this could happen," Sabarese said, "so both products will now be channeled through the dealers who will then work closely with the OEM," he stated, adding dealers will recommend a user go to an OEM if the added value suits that user's needs.

"And we will work with the OEM," he stressed.

The OEM speculated that while OEMs can now buy directly from Microdata, the price will be higher since, as a result of the meetings, the dealers "will get some dollars from anything Microdata sells to an OEM."

Fuller denied any trouble with the dealers and affirmed the company's policy to sell directly to OEMs as well as through dealers.

"But whether the OEM buys through a dealer or directly from us, the price will be the same," he stated, indicating that what would amount to the dealer's commission would in essence be charged as support and marketing costs for a Microdata-OEM sale.

"OEMs may feel that [the dealers' association] has caused the problem, but what really happened — and it was a clear decision on my part — [was] that because the software was late, I didn't feel I could take the risk of also introducing another possible perturbation by having new peripherals and new software in the marketplace at the same time.

"Frankly, it was a cautionary move on my part," he said.

Microdata's Side

The basic underlying problem for Express was an underestimation of the development time required for its new operating system, Fuller stated.

As a result of the three- to four-month delay, Microdata had to change its corporate strategy somewhat.

"There is nothing changed in the software," Fuller indicated, "but we have changed the hardware around somewhat. To limit our risk . . . we decided not to put the new peripherals on the Express in the early deliveries."

Instead, Express will make its debut with the Emos software and with older, more expensive peripherals which accounts for the difference in announced and actual prices, he said.

Fuller attributed part of the "retrenchment" decision to the OEMs, noting "we didn't expect OEMs to go out and put [Express] in end user applications as rapidly as they were intending to do. We tried to dissuade them from doing that.

"We felt OEMs were taking undue risks [by trying to get the system to the end user in an unproven application], but that's not something we have any control over," Fuller noted.

"But when the dust finally settled, we did not want to have a new software system and all new peripherals in the marketplace in a short timeframe," he said, indicating that was the rationale for the older peripherals.

These corporate decisions have not limited the system's performance fundamentally, only initially, Fuller said.

Express will do everything Microdata promised, but not in the short term, he added.

Orders & Installations

Armour-Dial, Inc. has ordered a complete computer automation system from General Automation, Inc. for its meat canning facility in Fort Madison, Iowa, and its soap plant in Aurora, Ill. General Automation will provide six GA-16/440 systems, program management, application software, hardware system design and electrical subcontracts for the installation.

Cordis Dow Corp. of Miami, manufacturer of artificial kidneys, has installed a Univac 90/30 system as part of a network linking its headquarters with manufacturing facilities in Miami Lakes, Fla., and Concord, Calif., and with connections to the firm's European headquarters in Brussels, Belgium, and a manufacturing site in Roden, Holland.

Thirteen Anthony's department stores in the greater Oklahoma City area are installing NCR 279 financial terminals to provide electronic banking links to the Oklahoma City National Sharedata computer center.

Bell Telephone Laboratories in Murray Hill, N.J., has ordered an S220 system from Harris Computer Systems.

Mobil Oil Credit Corp. has ordered four Trace document processing systems valued at $3.2 million from Recognition Equipment, Inc.

The *Trenton Times* is installing a T-410 publishing system from Tal-Star Computer Systems, Inc. to be used for editing and processing of local news, wire services, classified and display advertising and on-line real-time circulation updating.

Bashas Markets of Phoenix has installed an NCR Criterion for on-line application programs for buyers and warehouse operations and for payroll, order entry and accounting applications.

Contracts

TRW, Inc. has been awarded a $309 million contract by Western Union Space Communications, Inc. to build communications satellites for the National Aeronautics and Space Administration's Tracking and Data Relay Satellite System.

Ontel Corp. has received a $10 million contract from AEG-Telefunken for microcomputers.

Control Data Corp. has been awarded a contract by Security Pacific National Bank to install an Automated Money Transfer System.

GTE Sylvania, Inc. has received a $1.4 million contract from the U.S. Army for installation of a computer-controlled data processing, storage and retrieval system.

Utility Network of America has signed a contract with Paragon Data Systems for the utilization of a large-scale computer center in Kansas City.

Boeing Computer Services, Inc. has been awarded a five-year $1.1 million contract by the U.S. Air Force to provide software support services for the E-3A airborne warning and control system.

Bank of America has signed a contract with Rapidata, Inc. to offer computerized deposit and balance reporting to the bank's corporate customers using Rapidata's nationwide remote access computers.

Sanders Associates, Inc. has received a contract from the U.S. Air Force for an Area Control Center Display System that will be installed at the Vandenberg Air Force Base center to monitor and control aircraft operating in offshore test areas between San Francisco and San Diego.

Southeast Banking Corp. has signed a contract with Automatic Data Processing, Inc. for a state- and nationwide payroll processing system.

Credits Industry Orientation

Aerospace Contractor Takes Off in Service Mart

By E. Drake Lundell Jr.
Of the CW Staff

BALTIMORE — In the late 1960s many large defense and space contractors saddled with large computer facilities but faced with shrinking markets and recessionary pressures decided to sell their computer expertise on the open market.

But today it is hard to find many that succeeded in that effort — except for Martin Marietta Data Systems (MMDS), headquartered here.

There are several reasons for the firm's success, which is profitable with revenues of around $40 million annually, according to President Barry Rowe.

The firm has an advantage because it processes a great deal of work for Martin Marietta, its parent company, Rowe noted, even though that work only accounts for about 50% of its present revenues, a percentage that has been declining over the past few years.

Emphasis on Manufacturing

More important, according to Rowe, is the industry orientation followed by MMDS.

The firm has focused primarily on manufacturing in all phases of its business, which is split roughly into thirds between remote services, application systems and resource and facilities management, he said.

The manufacturing part of the business was a "neglected industry" in the 1960s, he said, and the pent-up market demand coupled with the in-house expertise of Martin Marietta bred success when the Data Systems division was set up.

MMDS primarily aimed at the middle to upper end of the manufacturing marketplace, he said, designing its systems for firms with typically over $20 million in revenues.

This market orientation helped particularly in the early days, Rowe indicated, since prospective customers were faced with recessionary pressures and high people costs which made them look for more efficient ways to conduct their business.

Modular Approach

Another factor in the success of the venture has been its modular approach toward the services it supplies, Rowe believes.

MMDS, he said, offers the full range of services from consulting through systems design to proprietary software. In addition it will supply computer power on a remote basis or will run a DP shop for a user on a facilities management basis. The firm also offers services for training and educating personnel within user organizations.

This modularity of service allows a customer to determine and get only those services he really needs, Rowe said. A user does not have to take services that are not needed in order to get the ones he wants, but rather can tailor the level of support received from MMDS to his specific needs, he added.

This concept applies not only to the services side of the business, but also to the applications software side, Rowe indicated, where MMDS can effectively offer users "custom" systems made up of various off-the-shelf modules in the firm's Modular Applications Systems (MAS) package. Once again, the user is not forced to take more — or less — than he really needs, Rowe indicated.

Concern for User

Along with this modular approach goes a feeling for real user needs and not just technology, according to Rowe. "We have to remember that technology is fascinating for us, but not quite that interesting to users," he said.

Timely Reports

The users are less worried about the technology than about getting reports that are both timely and accurate and systems that are delivered on time and work, he added.

While many of the aerospace firms who entered the computer services marketplace in the late '60s attempted to compete on just a price basis by offering time at low rates with few services, MMDS does not compete on a processing price basis, but rather on a full service basis, Rowe said.

This emphasizes the major difference between MMDS and those other aerospace conglomerates. MMDS actually became a "member of the industry" and not just an outsider selling time, according to Rowe.

Small Firm Attitude

To accomplish this, the firm has fostered a small company attitude internally, he indicated, with each part of its operation run as a profit center.

While Rowe personally reports monthly on the state of the business and the profits or losses to its parent firm, the rest of MMDS functions pretty much like a small concern, he said, with profit incentives of the managers involved in each of its operations.

At the same time, MMDS enjoys the advantages of the large corporation identity, he indicated, because users are assured it is going to stay in the business and that it has the financial strength and the reputation of a successful company behind it.

Burroughs Facing Import Penalties

DETROIT — The U.S. Customs Service is seeking civil penalties totaling about $42.5 million from Burroughs Corp. in connection with the import of parts and assemblies through the Port of Los Angeles.

The Customs Services claimed Burroughs underpaid duties on the items by about $370,000. The $42.5 million penalty is based on a Customs Service estimate of the domestic value of the imported parts and assemblies, according to a Burroughs spokesman.

Burroughs plans to contest the amount of the penalty as "clearly excessive," he said, adding the claimed amount of underpaid duties is "unsupported."

Burroughs believes the penalties will be reduced to an amount "bearing some reasonable relationship to the demonstrable loss of revenues."

Remote Services Marketing Slated as Seminar Subject

NEW YORK — A two-day seminar on marketing to the remote computer services industry is scheduled at the Harvard Club here May 2-3.

Sponsored by the market research firm of Frost & Sullivan, Inc. and Info-Dyne, Inc., a remote computing consulting firm, the seminar will include sessions on vending techniques, sales, marketing and planning strategies, corporate programming outlooks, management trends and product development.

Further information is available from Robert Sanzo at Frost & Sullivan, 106 Fulton St., New York, N.Y. 10038.

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Computer Management is a monthly magazine recently purchased by *Computerworld, Inc.* Monthly circulation is 30,000.

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Rank as importer from US: *Second*

Computerwoche is a weekly tabloid newspaper started by *Computerworld, Inc.* It has a circulation of 21,000 to the West German computer community.

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1975 DP expenditures: *$4.6 Billion*
1975 imports from US: *$189 Million*
Rank as importer from US: *Fifth*

Shukan is a weekly tabloid newspaper, jointly owned by *Computerworld* and Dempa publications. Circulation is 35,000.

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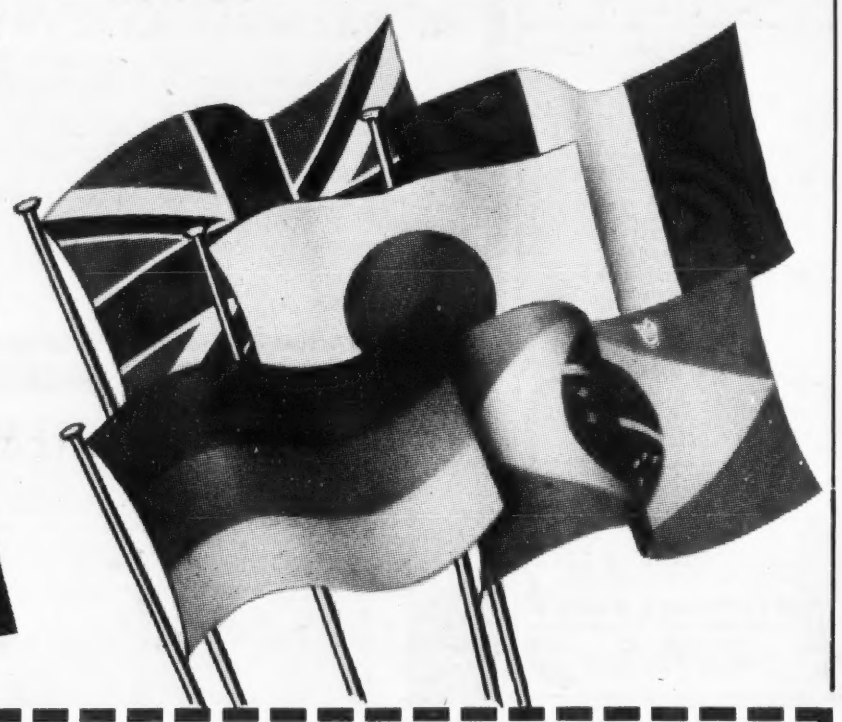

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Because of our size and number of offices, most of our consultants average less than twenty per cent travel.

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Mr. S.C. Anderson
Sperry Univac
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Requires experience in such areas as: MVS, JES II, TSO/TCAM, VTAM/NCP, VSAM, IMS, and multiple languages, including ALC, COBOL, FORTRAN OR MARK IV. Must possess ability to provide fast problem resolution, analyze and interpret performance data, recommend and develop standards.

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This position involves in-house teaching of OS/370, JCL, COBOL, structure programming, etc., writing standards for large scale data center and developing training programs for data processing trainees. The ideal candidate will have 5 years of large scale DP experience which includes experience in training activities with in-depth knowledge of COBOL and JCL. Must have strong communications skills. A degree in Computer Science is preferred.

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Forward resume outlining salary history to Frank Thompson, Digital Equipment Corporation, Dept. R328, 162 Main Street, Maynard, Massachusetts 01754.

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The salary is negotiable and fully competitive. The effective date of appointment is 1 June 1977, however the appointee may not be required to be present on campus until late summer, by arrangement with the Head of Department. Applications should be addressed to Dr. A.A. Mufti, Head of the Department of Computer Science, Acadia University, Wolfville, N.S. BOP 1X0.

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3 years digital computer programming/computer operations analysis experience, including 1 yr. experience in systems programming. MUST HAVE IBM OS/VS EXPERIENCE. Other anticipated vacancies.

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1831 W. Jefferson
Phoenix, Ariz. 85007

Opening

Position - Director of Management Information Services (MIS) - Region IV.
Function - to manage the Southwest and West Central Educational Cooperative Service Unit (ECSU) MIS organization, to plan system development and coordinate with State Department of Education.
Education - Degree in Administration/Management in Education/Business, Computer Science or related field.
Experience - experience in computer based MIS and/or as a user in an educational agency.
Deadline - April 15, 1977.
Starting Date - July 1, 1977.
Salary - $20,000 - 24,000
Apply to - Glen Shaw, Regional Director, SW & WC ECSU, Southwest State University, Marshall, MN 56258, phone (507) 537-7141.

PROGRAMMERS/ ANALYSTS

Your talents in systems are needed by our young growing organization. We have interesting and varied ground floor opportunities available in Chicago and Atlanta for programmers, programmer analysts and project leaders. Basic requirements in Chicago are two + years experience in programming/analysis, using Cobol and BAL primarily in IBM and Univac environments. Of particular interest in Atlanta is experience with Burroughs B700 systems utilizing Cobol. You will have the opportunity to utilize your full capabilities as well as grow in an ever changing environment within this dynamic firm. Salaries flexible. Call or send resume to Pete Whittaker for confidential consideration. NORRELL SYSTEMS SERVICES, 3092 Piedmont Rd., N.E., Atlanta, GA 30305. (404) 262-2100.

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Find out today how your personal and professional goals stack up next to the new, once-in-a-career opportunities in Data General's expanding Advanced Systems Development Group.

Talk directly with technical staff members about the long and short term projects now underway, utilizing high-speed logic, Soft Architectures, Multiprocessing Systems, Advanced Security Mechanisms and related state-of-the-art techniques.

Discover the benefits of working with a young, informal organization that redefined the industry with the NOVA®, ECLIPSE® and microNOVA computer systems, while growing to more than $160 million in annual sales in less than nine years.

Check the chart. Choose the position that matches your qualifications best, then call or write for more information, or to arrange for an interview within the next few weeks at a city near you.

	Understanding of Advanced Computer Architectures	Minicomputer Industry Experience	Large Mainframe Development Experience	Operating Systems & Compiler Experience	"Hands-On" Microprogramming Experience	ECL Design Experience	Familiarity with I/O Systems Design	Familiarity with Security Mechanisms	Power & Signal Distributional Experience	Technical Degree	Advanced Technical Degree	Minimum 2 Years' Experience	Minimum 4 Years' Experience	Minimum 6 Years' Experience	Motivated & Eager to Move in an Exciting, Fast-moving Environment.
Manager, Systems Design	●		●	●			●	●			●			●	●
Manager, ECLIPSE Systems Design	●	●		●			●							●	●
Manager, Firmware Systems	●			●	●					●					●
Manager, Systems Maintainability			●	●			●	●		●			●		●
Senior Logic Designers			●			●	●			●			●		●
Logic Designers		●					●			●					●
Senior Electrical Engineers			●			●			●	●				●	●
Microprogrammers		●		●	●					●			●		●

Call Today for a Technical Interview

Technical Staff members will be available all this week March 20 to 25 to discuss these opportunities in detail. Call (617) 481-5160 collect TODAY thru FRIDAY from 5 PM to 9PM (EST) for an immediate discussion or to arrange for an interview in any one of the 12 major metropolitan areas we will be visiting in the next few weeks.

If you prefer, you may mail your resume or a detailed letter to D. C. Turner, Professional Staffing, Data General Corporation, 16 Turnpike Road, Westboro, MA 01772. An equal opportunity employer.

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SENIOR SYSTEMS PROGRAMMER

We have an immediate opening at our San Fernando Valley computer center for a senior systems programmer who enjoys taking on diversified assignments and believes that professional growth comes from nonstop technical challenges.

Our systems staff plays a key role in developing and enhancing "leading edge" systems for timesharing. RJE, batch, and DBMS applications in business, finance, engineering, government, and the professions.

We're looking for a creative, self-motivated professional with at least 3 years' recent systems programming experience with 360s or 370s, Model 65 or up. Must have strong experience with O/S MVT, ALC, HASP, text-editing, 3705, BTAM or VTAM, TSO, and online systems.

Also desirable: a degree in computer science; PL/1 as a second language; experience with DBMS, SVS, MVS, CICS, and computer measurement evaluation.

If you're interested, please send us your resume. Or call Manager of Systems Programming at:

Proprietary Computer Systems, Inc.
16625 Saticoy St.
Van Nuys, Calif. 91406
(213) 781-8221
Equal Opportunity Employer M/F

PCS

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Assume responsibility for the creation, organization, security and overall efficiency of data bases throughout the company. Previous experience in data base design and implementation plus a degree in business or related field required. Masters preferred, 6-8 years progressive DP experience that includes recent experience in IMS, IDMS, or TOTAL is essential.

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Responsibilities will center on translation of user needs into system applications. Business degree or related discipline is mandatory, MBA preferred. 3-5 years experience in systems analysis and a thorough understanding of general business principles are essential.

We offer an excellent salary range commensurate with experience and technical expertise, complete benefits and outstanding opportunities for career advancement and recognition. Send a letter or resume in confidence including salary history to: Mr. B. Brodie.

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TECHNICAL SUPPORT HIS 6000 SERIES

We require experienced Software Analysts to provide technical support to our Honeywell 6040 computer installation.

Duties will include the maintenance, documentation and trouble-shooting of GCOS and utilities, helping users with development and operating problems, and assisting with specific projects requiring specialized technical support. Other activity areas include job accounting, planning of hardware/software requirements, and maintenance of internal and external program libraries.

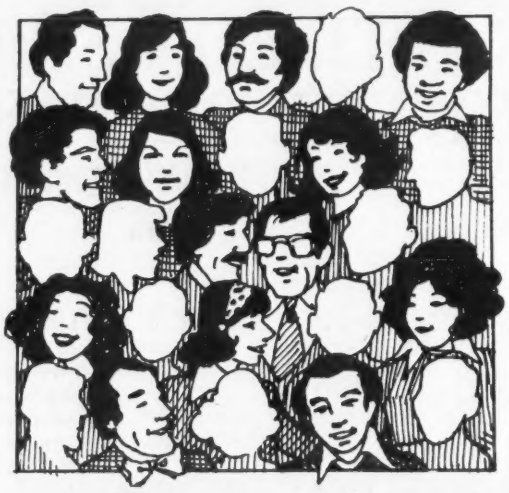
Desired qualifications include a minimum of 2 years experience with the HIS 6000 series, with special emphasis on GCOS and TSS, GMAP and Fortran. Some experience with GRTS would be advantageous.

Please apply in writing, giving full particulars of professional training, education, employment and salary history, quoting file number A827, to:

Employee Relations Department, PanCanadian Petroleum Limited
One Palliser Square P O Box 2850, Calgary, Alberta T2P 2S5

PanCanadian Petroleum Limited

Fourteen of our top twenty-five Sales Engineers never sold computers before they came to Data General.



They were Software Support Engineers, Customer Engineers, Systems Programmers, Hardware Designers...you name it.

The point is this: You can stick to your job for the next 18 months, or become a Sales Engineer at Data General, sell computers for a year—and you'll make the same money. Or more. You already have the technical credentials and, if you enjoy dealing with people and working in a competitive environment, there's no limit to what you can earn as a Sales Engineer at Data General.

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Computer Sales Engineers
We require solid technical background in mainframes, minis or systems—plus the ability to open up new OEM and end user accounts is a must.

New positions are available in the following locations: Albuquerque, Baltimore, Birmingham, Boston, Chicago, Dallas, Denver, Huntsville, Knoxville, Little Rock, Los Angeles, Manhattan, Miami, Mobile, New Haven, New Orleans, Norfolk, North Jersey, Orlando, Philadelphia area, Phoenix, Portland, Richmond, St. Louis, Salt Lake City, San Diego, San Francisco Bay area, Seattle and Washington, D.C.

We need Systems Engineers in these areas as well.

To apply for a position call Jim Masciarelli collect at (617) 485-9201, and send your resume to him at Data General Corp., 15 Turnpike Rd., Westboro, MA 01581.

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and Career Planning Guide

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Source Edp's *1977 Computer Salary Survey* is now available. This authoritative and up-to-the-minute report will allow you to compare your compensation directly with professionals across the country performing the same duties you perform. It also examines in detail the strategies and techniques thousands of successful computer professionals have used to enhance their careers. After fifteen years of recruiting experience, Source Edp knows how you can gain broader professional exposure, maximize your compensation and break into management. It's all in Source Edp's *1977 Computer Salary Survey* and career planning guide.

For your FREE copy, call the Source Edp office nearest you.

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New York/ New Jersey	201/687-8700	Denver	303/773-3700
Philadelphia	215/665-1717	Fort Worth	817/338-9300
Washington, D.C.	703/790-5610	Houston	713/626-8705
		New Orleans	504/561-6000
Midwest		**West Coast**	
Chicago	312/782-0857	Irvine, Ca.	714/833-1730
Oak Brook, Ill.	312/986-0422	Los Angeles	213/386-5500
Cleveland	216/771-2070	Palo Alto	415/328-7155
Detroit	313/352-6520	San Francisco	415/434-2410
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(When writing, please be sure to indicate home address and current position title.)

If unable to call, write:
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Oak Brook, Illinois 60521

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Join this multi-national industrial staffing enlarged EDP Dept. Need many "action oriented" professionals. Large scale applications. Relocation & fee paid.

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Send resume (state salary) to:
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111 Prospect Street
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Data Processing

If you are interested in relocating to the beautiful Pacific Northwest, we currently have several excellent positions for EDP professionals with banking systems or programming experinece. Send resume in confidence to Jim Morris, Hauser, Martin, Morris & Associates, 1621 114th S.E., Suite 219, Bellevue, WA. 98004.

PROGRAMMER/ANALYST

Reno Area

Would you like to live in an area that offers clean air, bountiful recreation and a good environment to raise children: Immediate opportunity for self-starter to work on IBM 370 and Burroughs B4700 systems.

Requirements include:

* 3 to 5 years Analysis and Design experience
* Heavy COBOL background a must
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* IBM DOS/VS and/or OS/VS1 knowledge desirable

We offer a competitive salary commensurate with experience. If you meet the qualifications please send your resume and salary history to:

CW Box 4952
797 Washington St.
Newton, Mass. 02160

Systems Programmers

OS Backgrounds

The proposed conversion of R.J. Reynolds Industries large-scale computer operations from DOS/VS to OS/MVS offers excellent growth opportunities to Systems Programmers who aim at expanding their abilities in a high-challenge environment. In addition to being involved in our mode of operation from the inception, those qualified will find several added reasons to consider joining RJR.

- One is diversity. This Fortune 100 corporation is heavily involved in many growth industries, including foods, tobacco, metals, transportation, packaging and petroleum.
- Another is our commitment to maximizing the ways our computer facilities are utilized. This means multiple applications ranging from marketing to financial to process, materials and inventory control, to name but a few.
- The value we place on EDP skill is demonstrated by the salary structure in this area, plus the excellent benefits package, plus our rapid relocation. And our headquarters is in one of the most attractive living areas of the East Coast.

To qualify you should have two or more years experience, preferably in OS VS2MVS, TSO and JES II. We will also consider experience in OS MVT, VS1 or VS2 SVS. A degree or comparable experience is desired.

Write in confidence, including resume and salary requirements, to: Mr. Denis G. Simon, Manager of Employment, R.J. Reynolds Industries, Inc., 401 North Main St., Winston-Salem, N.C. 27102.

RJR
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First, your get growth potential because you'll be working with one of the fastest growing independent third party computer service company in the industry. Raytheon Service Company has built a successful reputation for responsive, responsible total system service over the last fifteen years and we're still growing.

Second, you'll be supported by a worldwide, multi-million dollar, organization with more than 50,000 employees. This means the best training, documentation equipment and parts inventory you'll find in any service operation – anywhere. Furthermore, you get the liberal benefits you'd expect of a FORTUNE 500 firm plus the challenge and opportunities of a successful smaller company.

Sound like a great opportunity? It is. So if you're interested, look into positions which currently exist in the following Raytheon Service Company locations:

Chicago	New York
Dallas	St. Louis
Detroit	San Francisco Bay Area
Minneapolis	Washington, D.C.

If you think you qualify, send your resume and salary history to David Murray, Raytheon Service Company, 2 Wayside Road, P.O. Box 503, Burlington, MA 01803. Or call 617-272-9300, ext. 302.

CUSTOMER ENGINEERING OPENINGS

SENIOR CUSTOMER ENGINEER

to handle the most complex installation, repair and maintenance tasks on a full-range of major customer equipment. This senior position carries a diversity of responsibilities for major accounts and includes responsibility for training other personnel and for functioning as regional technical support specialist.

CUSTOMER ENGINEER

to install and service a variety of customer computer equipment. This includes preventative maintenance, troubleshooting, diagnostics and repair, and possibly account responsibility.

ASSOCIATE CUSTOMER ENGINEER

to service a range of computer equipment: troubleshoot and diagnose common equipment problems and make repairs – under the direction of senior service personnel.

CUSTOMER ENGINEER TRAINEE

an entry level position in customer service – to learn, under direct supervision, the troubleshooting, repair and maintenance of customer computer equipment.

These positions include experience with IBM 360/370 systems with compatible memories; IBM plug-compatible peripherals; Honeywell 200, 2000, and 3200 systems and related peripherals.

NATIONAL TECHNICAL SUPPORT SPECIALIST

to assist in the development of business plans and equipment take-over . . . to analyze machine failures . . . to coordinate support efforts . . . and to carry on on-going review of field service staff and support requirements. Eight to ten years experience required.

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to pursue computer service sales activities in assigned territories. Compensation includes an attractive base salary plus a progressive commission plan. Candidates should have related direct sales experience.

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ACADIA UNIVERSITY

Systems Analyst

Applications are invited for the position of Systems Analyst in the Computer Centre at Acadia University. Desired experience is in the area of administrative system analysis and support. Proficiency in COBOL will be an asset.

The qualifications required are a degree in Computer Science or its equivalent. Suitable candidates may also be requested to assist the Director of the Computer Centre in the administration of the Centre.

Acadia University,
Wolfville, Nova Scotia, Canada
BOP 1X0 Attn: L.G. Jaeger.

INFO. SYSTEMS FACULTY

Faculty position at assistant/associate professor level in growing Dept. of Information Systems begins Sept. 1, 1977. Extensive software background and qualifications to teach courses in assembler, data base design and operating systems and ability to contribute to development of a graduate program in Information Systems. PhD pref. but will consider Master's degree with exper. An Equal Opportunity/Affirmative Action employer. Send letter of application and a detailed resume by April 15 to:

Bruce M. Saulnier, Chairman
Dept. of Information Systems
Quinnipiac College
Hamden, CT 06518
(203) 288-5251, x214

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Mgr Advanced Systems **$25M**
Will have the latest IBM OS/VS With his staff of 9-10 specialists incl. data base Adm. successful candidate will have track record and fit into a dynamic opportunity.

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Will revamp and/or implement New and highly informative Financial and Accounting Sys. A major system will be policy owner Data Base. Candidate must be strong in systems, finance, accounting-CPA-helps.

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Will design and implement new claims data base and retrieval Sys for both processing and analysis.

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Your Account Exec will be MR. JAY ALLEN. He has held positions of: Chief Exec Officer of a National Service Co., DP Mgr of both Insurance and banking, 20 years fast track in DP Field. He is only one of 1020 account exec with unparalleled exper in this field.

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We're INTERDATA, where expansion and growth continue to create a demand for the best minds in the industry. If you're interested in daily challenge, a stimulating working environment and recognition of your special abilities, INTERDATA is the name to know. Outstanding opportunities are available for talented professionals with experience in the following areas:

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INTERDATA, a name to know, wants to know your name. Introduce yourself to AL NASEEF at the INTERDATA Employment Hospitality Suite at the ATLANTA AMERICAN MOTOR HOTEL. Stop in any time.

Career-making positions are available on all levels in any of the following areas: Operating Systems; Utilities, Software Quality Assurance; Diagnostics; Languages; and Data Base Management Systems.

If you can't make it, send your resume including salary history in strictest confidence to: Bill Beattie at our New Development Facility in Tinton Falls.

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Network Design and Data Transmission Systems

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COMPUTER SCIENCE

Director of Computer Center; anticipated staff position beginning as early as July 1, 1977. Center composed of IBM 1130, IBM System 32, and Time Sharing Terminal to a DEC system 10. Candidate will also be expected to teach two courses a semester. M.S. in Computer Languages and Software as related to Data Processing. Applicant should also be familiar with business system applications of Data Processing. Apply by April 22, 1977, to: Dr. August Freda, Chairman, Engineering & Computer Science Divisions, University of Pittsburgh at Bradford, Bradford, PA 16701. Affirmative Action/Equal Opportunity Employer.

DATA PROCESSING SALES

Data processing service bureau in Southern California needs experienced salesperson to start marketing dept. Excellent opportunity for the right person. Submit resume with salary history (a must) in complete confidence to R. Park – P.O. Box 1983, Santa Ana, Calif. 92702.

FACULTY POSITION

The Department of Mathematics and Computer Science at the University of Nebraska at Omaha has a permanent position open at the Assistant/Associate Professor level starting September, 1977. Responsibilities include undergraduate and graduate teaching, research participation and curriculum development toward a proposed Masters degree in Applied Computer Science. Applicants should have a doctorate, recent publications and expertise in any of the following areas: minicomputers, microprocessing, data base or teleprocessing. Any industrial experience an added plus. Salary and rank dependent on qualifications. Inquiries and current vita should be directed to:

Dr. Margaret P. Gessaman,
Chairperson
Department of Mathematics/
Computer Science
The University of Nebraska
at Omaha
Omaha, Neb. 68101

UNO is an Equal Opportunity/ Affirmative Action Employer

CYBER SYSTEMS PROGRAMMER

Dallas Location

Su ntech, Inc., a newly formed, rapidly growing subsidiary of Sun Company, Inc., is seeking a person experienced in CDC operating systems internals.

Working with a CYBER 172, running NOS/VE, you will evaluate, generate, and when required modify CDC operating system and support software. You will participate in, and/or lead, hardware and software evaluation and other technical studies.

We offer attractive compensation, benefits, and working conditions.

To apply, send your resume, complete with salary history, to: Mr. Steven M. Church, Suntech, Inc., PO Box 2880, Dallas, Texas 75221.

SUN COMPANY, INC.
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Equal Opportunity Employer

FLORIDA

MANAGER OF TECHNICAL ADMINISTRATION & PLANNING

This position reports directly to the Top Computer Executive and is responsible for: Five-Year Plan, Budgets, special projects, overall project management, coordination of problems; policy and procedure development, Personnel and Training coordination; and facilities management.

This is a large IBM installation which has a steady growth in a highly profitable company.

Requirements: Management experience; at least 5 years data processing experience; ability to coordinate people; must have bachelor's degree, masters degree would be a plus.

Please send resumes to:

CW Box 4954
797 Washington Street
Newton, Mass. 02160

MINICOMPUTER MAINTENANCE ENGINEERS

Field Service Engineers with at least 3 years experience maintaining DEC PDP-11 Family of Minicomputer CPU's and their peripherals. Should be a technical school graduate or have equivalent experience and training. Requires comprehensive knowledge of complex data acquisition systems, communications systems, etc. using PDP-11/40's, 11/45's, 11/34's, etc.

Candidates must have demonstrated ability to write simple machine language test routines, understand thoroughly internal structure and interflow of data within processors, and be knowledgeable in use of MAINDEC and DEC-X diagnostics. Familiarity with non-DEC peripherals is an asset.

The University of California's Los Alamos Scientific Laboratory offers excellent working conditions and fringe benefits. Located high in the mountains of Northern New Mexico, the living is uncrowded and casual; the environment is pollution-free; the climate is superb – cool summers and mild winters; and recreational opportunities abound.

Send resume and salary requirements in confidence to:

R. Lynn Wilson, Recruiting Director
Division - 77-M
Los Alamos Scientific Laboratory
P.O. Box 1663
Los Alamos, New Mexico 87545

los alamos SCIENTIFIC LABORATORY OF THE UNIVERSITY OF CALIFORNIA

An Affirmative Action/Equal Opportunity Employer U.S. Citizenship Required

PROGRAMMER/ANALYST

Are you looking for a challenging place to work and an enjoyable place to live?

Polk County Information Systems in Bartow, Florida is expanding rapidly and needs Programmer/Analyst for a large 370-135 DOS/VS shop. Programmer/Analysts with ANS-COBOL and CICS preferred. These positions offer a wide range of applications for a governmental agency. Minimum salary: $14,144. Qualified applicants should write or call: Mrs. Fredericks, Personnel Office, P.O. Box 60, Bartow, Florida 33830; (813) 533-1161.

Equal Opportunity Employer M/F

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Compensation $35,000

A major multi-national corporation, manufacturing and marketing computer based systems, seeks several Branch Marketing Managers for major eastern cities. Candidates should have a proven background in managing & directing sales, systems and administrative functions.

A more than competitive bonus plan provides financial reward for over achievers. If you have demonstrated marketing expertise as a Branch Marketing Manager and seek the opportuntiy for rapid growth and promotion, send detailed resume in confidence to this equal opportunity employer.

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TVA 43 YEARS OF PEOPLE IN PARTNERSHIP

ANALYST/PROGRAMMERS

The Tennessee Valley Authority is seeking several highly qualified analysts/programmers with experience in Data Base Management Systems (DBMS), On-Line Processing Applications, and program development for large computer systems.

TVA's computing facility consists of two IBM 370/165's with 6 megabytes of main storage supporting more than 100 time sharing terminals and 17 remote processors under OS/MVT, HASP, TSO, System 2000, and INTERCOMM, and substantial expansion is in progress.

Work involves any and all aspects of professional systems analysis and associated programming. The positions emphasize skills and interests in the following areas:

- *Systems analysis and programming for development projects*
- *Technical support of general-use application programs*
- *Data administration and control*
- *Tutoring and teaching formal classes on ADP techniques*

Applicants should have a bachelor's degree in mathematics, economics, computer science, or one of the scientific disciplines plus three to five years' experience in programming applications on an IBM system comparable to the one described above. Competence in programming COBOL is essential, and experience with FORTRAN is desirable.
Salary range $17,000 to $20,000-depending on qualifications and experience. Excellent fringe benefits. Vacancies are in Chattanooga, Tennessee.

TENNESSEE VALLEY AUTHORITY
Knoxville, Tennessee 37902
Telephone: 615-632-2296

An Equal Opportunity Employer

Send resume or call
Employment Branch CW-48, Room 232 MIB

DIRECTOR OF COMPUTER SUPPORT SERVICES

Ohio University is seeking an experienced professional to direct the computer operations and systems programming functions of the university computer center. Our present equipment includes a 270/158-2 meg CPU with related tape-disk-and TP hardware-VM-OSVS-CICS.
Major responsibilities are to direct and supervise operations and operators, direct and supervise the sytsems programming staff, maintain efficient operating systems and provide technical support to other elements of the department.
Qualifications include a degree plus 5 years experience in computer operations supervision and systems programming and knowledge of operating systems and utilities.
Salary - $18,000 plus liberal employee benefits.
Alden Dalzell, Director Computer Services, Ohio University, Haning Hall, Athens, Ohio 45701 Deadline: 4/29/77 *Equal Opportunity/Affirmative Action Employer*

SOFTWARE PROG

Tech. oriented pro required by client with growing data center. Must be experienced in O/S internals and SYSGENS. Will be proj. mgr. for small tech support staff. $20,000 (Fee paid) Contact P. Siegal

ROBERT HALF PERSONNEL AGENCIES
1310 Liberty Bank Bldg
Buffalo, N.Y. 14202 M/F
(716) 842-0801

SYSTEMS ANALYST

DATA BASE! BAL!
VSAM! IBM 370!
DOS-VS! COBOL!

If these are more than just words — practical operating concepts with which you are familiar & have direct experience, we'd like to talk with you. We need an experienced (3-5 yrs.) systems analyst to plan, design and implement the data base & reporting systems for a growing Wisconsin-based casualty insuror. Insurance background preferred — but ability to interface with users at all levels is mandatory. True advancement opportunity, top salary & benefits to right person. Contact Personnel Director, (414) 458-9131 Ext. 226 or send resume to:

HERITAGE INSURANCE
2300 Kohler Memorial Dr.
Sheboygan, WI 52081
Equal Opportunity Employer

PROGRAMMER/ ANALYST

Opportunity for highly talented individuals with minimum of three years in business oriented data processing. To qualify you should have broad experience in dealing with people and computer systems.
Desirable qualifications are:
- Systems analysis, design and implementation of financial systems.
- Programming with IBM SS/360, S/370 assembler language, or COBOL for IBM or Burroughs system.
- Systems and program documentation
- Mini-computer system.

This position has upward mobility into a number of areas, both technical and administrative. Salary $15,000-$20,000, depending on qualifications.
Please send resume to:
Dalbar Financial Services, Inc.
545 Madison Avenue
New York, N.Y. 10022
(212) 759-3860

SYSTEMS DESIGNER I

The University of Georgia currently has a vacancy for a Systems Designer I. Applicants should be knowledgeable and skilled in the following: Business or Educational Administrative Data Processing; Interactive Applications; several programming and control languages; including COBOL, MARK IV, TSO, OS JCL; OS Concepts and Facilities; effective verbal and written communication. Also, IMS and other data base experience desirable. Degree desired, but not mandatory. Submit resume with salary history to: Manager, Personnel Department, Personnel Services Bldg., University of Georgia, Athens, GA. 30602. *An Equal Opportunity/Affirmative Action Employer.*

SYSTEMS PROGRAMMER

Contact us if you are ready to accept increased responsibility and would like to perform your functions during normal working hours.

Transcon is expanding the systems programmer staff to support the increasingly complex operating systems, a growing TP network and a demanding operations environment.
Our current operating systems are OS/MFT, VS1 and VM. Our hardware consists of a 370/158, 3705 front end and a nationwide TP network of over 200 terminals.

The position requires a minimum of 2 years experience as a systems programmer plus the sysgen and installation of VS1 system.
We offer a competitive salary, profit sharing and an excellent life and health insurance plan. Position is available in the corporate offices in the LAX airport area.
Please send resume with salary history to:

TRANSCON LINES
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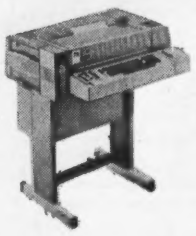

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Computerworld presents a special report on **Distributed Processing** in the March 28th issue.

Computerworld's next special report will explore the wide open world of distributed data processing, starting with the hardest problem of all: defining what these buzz words mean. We'll have experts on hand to tell us, in their own words, just what constitutes a distributed processing system, and what does not. They might not agree, of course, but it should make enlightening reading for just about everyone.

Edited by Ron Frank, this special report will include a variety of information on distributed data processing. In all, it could help you make an informed decision on what some are calling the "wave of the future", and what others think of as three confusing words. So if you'd like to consider the benefits of a distributed system, or if you already have one, be sure you read the March 28th *Computerworld*.

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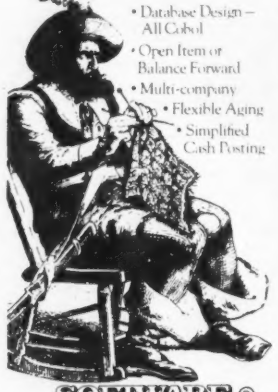

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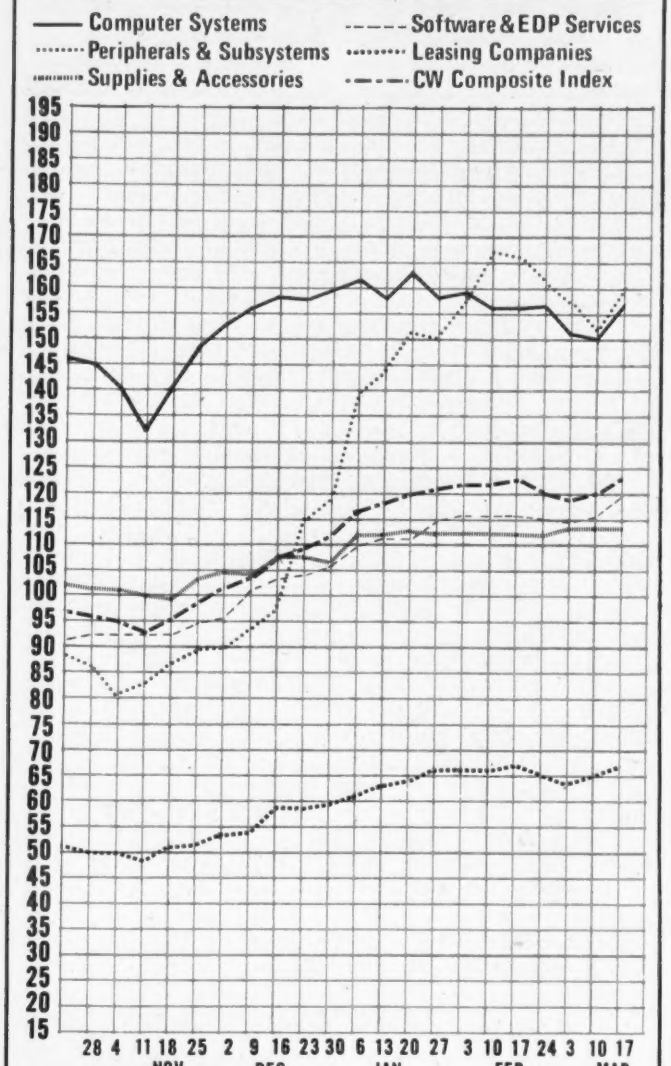

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a-Adjusted for November 1976 three-for-one stock split.

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Three Months Ended Dec. 31

	1976	1975
Shr Ernd	.....	$.01
Revenue	$3,669,000	4,220,000
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Earnings	(1,297,000)	16,000
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Tax Cred	.....	86,000
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	a1976	1975
Shr Ernd	$.30	$.12
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a-Results reflect merger between Intersil and Advanced Memory Systems.

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	1976 (000)	1975 (000)
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Three Months Ended Dec. 31

	1976	1975
Shr Ernd	$.41	$.36
Revenue	242,800,000	213,600,000
Earnings	9,600,000	6,700,000
9 Mo Shr	1.12	1.14
Revenue	701,200,000	590,800,000
Earnings	26,300,000	21,300,000

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TRADE*QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, MARCH 16, 1977

All statistics compiled, computed and formatted by TRADE*QUOTES, INC. Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		1976-77 PRICE RANGE (1)	CLOSE MAR 16 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	AMDAHL CORP	23- 40	28	0	0.0
N	BURROUGHS CORP	66-108	69 3/8	+3 3/8	+5.1
O	COMPUTER AUTOMATION	10- 25	25 1/8	+2 3/4	+12.2
N	CONTROL DATA CORP	18- 27	22 3/4	+ 1/4	+1.1
N	DATA GENERAL CORP	40- 60	45 3/8	+3 5/8	+8.6
O	DATAPOINT CORP	20- 46	24	+2 3/4	+12.9
N	DIGITAL EQUIPMENT	41- 60	45 1/4	+4	+9.6
N	ELECTRONIC ASSOC.	2- 5	2 3/8	+ 1/8	+5.5
A	ELECTRONIC ENGINEER.	7- 16	8 1/8	+ 1/4	+3.1
O	FOUR-PHASE SYSTEMS	13- 21	14 3/4	+ 3/8	+2.6
N	FOXBORO	28- 51	48 1/2	+1 3/4	+3.7
O	GENERAL AUTOMATION	4- 11	7 1/8	+ 1/8	+1.7
O	GRI COMPUTER CORP	1- 1	5/8	+ 1/8	+25.0
N	HEWLETT-PACKARD CO	69-117	75 3/4	+4 1/4	+5.9
N	HONEYWELL INC	34- 56	49 1/8	+1 1/8	+2.3
N	IBM	227-288	284	+4 3/8	+1.5
O	MANAGEMENT ASSIST	1- 9	7 1/8	- 5/8	-8.0
O	MEMOREX	17- 33	28	+2 1/8	+8.2
O	MICRODATA CORP	7- 28	8	-1 1/4	-13.5
O	MODULAR COMPUTER SYS	3- 14	5 3/4	+ 3/8	+6.9
N	NCR	24- 38	37 1/8	+2 3/4	+8.0
O	PRIME COMPUTER INC	4- 18	14 1/8	- 7/8	-5.8
N	PERKIN-ELMER	19- 27	18 1/4	+ 1/2	+2.8
N	RAYTHEON CO	45- 67	56 3/8	+1 3/8	+2.5
N	SPERRY RAND	38- 52	38 1/8	+ 5/8	+1.6
O	SYCOR INC	9- 31	11 3/8	+ 3/4	+7.0
A	SYSTEMS ENG. LABS	5- 10	6 1/4	+ 1/8	+2.0
N	VARIAN ASSOCIATES	12- 19	17 7/8	+ 7/8	+5.1
A	WANG LABS.	11- 20	17 1/2	+ 3/8	+2.1

LEASING COMPANIES

EXCH		1976-77 PRICE RANGE (1)	CLOSE MAR 16 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	BOOTHE COMPUTER CORP	1- 9	9 3/8	- 1/8	-1.3
O	COMDISCO INC	3- 13	10 3/4	0	0.0
A	COMMERCE GROUP CORP	2- 3	1 7/8	0	0.0
A	COMPUTER INVSTRS GRP	1- 3	1 3/8	+ 1/4	+22.2
M	DATRONIC RENTAL	1- 8	1 1/4	0	0.0
A	DCL INC	1- 2	1 1/2	0	0.0
N	DPF INC	5- 8	7 3/8	+ 3/8	+5.3
N	ITEL	6- 16	14 1/2	+ 3/4	+5.4
N	LEASCO CORP	6- 22	19	0	0.0
O	LEASPAC CORP	0- 1	1	+ 1/4	+33.3
O	NRG INC	0- 1	1/4	0	0.0
A	PIONEER TFX CORP	6- 11	8 5/8	- 1/8	-1.4
N	U.S. LEASING	7- 12	10 7/8	+1	+10.1

SOFTWARE & EDP SERVICES

EXCH		1976-77 PRICE RANGE (1)	CLOSE MAR 16 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	1- 3	1 3/8	0	0.0
O	ANACOMP INC	6- 11	8 1/4	- 1/8	-1.4
A	APPLIED DATA RES.	2- 7	5 3/4	- 1/8	-2.1
N	AUTOMATIC DATA PROC	17- 35	25 1/4	+1 5/8	+6.8
O	COLEMAN AMERICAN COS	2- 6	2	- 1/8	-5.8
O	COMPU-SERV NETWORK	3- 15	14	+ 1/4	+1.8
O	COMP ELECTION SYSTMS	5- 9	7 1/2	+ 3/4	+11.1
O	COMPUTER HORIZONS	1- 2	1 1/4	0	0.0
O	COMPUTER NETWORK	2- 8	6 5/8	+ 1/4	+3.9
N	COMPUTER SCIENCES	4- 9	7 7/8	+ 1/4	+3.2
O	COMPUTER TASK GROUP	1- 2	1 1/4	0	0.0
C	COMPUTER USAGE	2- 6	2 3/8	- 1/8	-5.0
C	COMSHARE	2- 9	5 1/2	0	0.0
O	DATA DIMENSIONS INC	2- 5	4 5/8	0	0.0
O	DATATAB	1- 2	2 1/4	+ 3/8	+20.0
N	ELECTRONIC DATA SYS.	12- 19	16 1/8	- 1/8	-0.7
O	INFONATIONAL INC	1- 1	1/8	0	0.0
O	INSYTE CORP	1- 3	2	0	0.0
O	IPS COMPUTER MARKET.	1- 2	3/4	0	0.0
O	KEANE ASSOCIATES	2- 4	2 7/8	- 1/8	-4.1
O	KEYDATA CORP	1- 5	2 5/8	0	0.0
A	LOGICON	3- 14	13 7/8	+2 3/8	+20.6
A	MANAGEMENT DATA	1- 3	1 3/8	0	0.0
A	NATIONAL CSS INC	13- 25	20 3/8	+ 3/8	+1.8
O	NATIONAL DATA CORP	4- 7	5 1/2	- 1/8	-2.2
A	ON LINE SYSTEMS INC	17- 23	19 3/4	0	0.0
N	PLANNING RESEARCH	3- 5	3 3/4	0	0.0
O	PROGRAMMING & SYS	1- 1	5/8	+ 1/8	+25.0
O	RAPICATA INC	2- 5	1 7/8	- 1/8	-6.2
O	REYNOLDS & REYNOLD	13- 21	17 1/4	- 1/4	-1.4
O	SCIENTIFIC COMPUTERS	1- 2	2	0	0.0
O	TYMSHARE INC	14- 28	17 1/4	+1	+6.1
A	URS SYSTEMS	3- 5	4	0	0.0
N	WYLY CORP	1- 7	1 5/8	0	0.0

PERIPHERALS & SUBSYSTEMS

EXCH		1976-77 PRICE RANGE (1)	CLOSE MAR 16 1977	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADDRESSOGRAPH-MULT	9- 14	12 1/2	+1 1/8	+9.8
O	ADVANCED MEMORY SYS	4- 10	7 3/8	+ 3/8	+5.3
N	AMPEX CORP	5- 10	8 3/4	+ 7/8	+11.1
O	ANDERSEN JACOBSON	2- 4	3 7/8	+ 1/8	+3.3
O	APPLIED DIG DATA SYS	10- 25	12 1/8	+1 1/8	+10.2
C	BEEHIVE MEDICAL ELEC	3- 12	10 1/2	+ 1/2	+5.0
A	BOLT,BERANEK & NEW	7- 11	7 1/4	- 3/8	-4.9
N	BUNKER-RAMO	5- 12	11 3/8	- 1/4	-2.1
A	CALCOMP	3- 7	3 1/4	0	0.0
O	CAMBRIDGE MEMORIES	0- 6	1 3/8	+ 3/8	+35.2
N	CENTRONICS DATA COMP	20- 36	24	+ 1/8	+0.5
O	CODEX CORP	22- 47	46 1/4	+2 1/2	+5.7
O	COGNITRONICS	1- 1	1	0	0.0
O	COMPUTER COMMUN.	1- 6	5 1/2	- 3/8	-6.3
O	COMPUTER CONSOLES	4- 7	4	0	0.0
A	COMPUTER EQUIPMENT	1- 3	2 1/4	+ 1/8	+5.8
O	COMPUTER TRANSCEIVER	1- 3	1 1/4	+ 1/8	+11.1
C	COMTEN	4- 13	12 1/4	+1	+8.8
N	CONRAC CORP	20- 27	24 7/8	+ 1/2	+2.0
O	DATA ACCESS SYSTEMS	1- 5	5 1/2	+ 1/4	+4.7
O	DATA 100	6- 13	7 7/8	+ 1/8	+1.6
A	DATA PRODUCTS CORP	5- 15	11 3/8	+ 5/8	+5.8
O	DATA TECHNOLOGY	1- 3	2 7/8	0	0.0
O	DATUM INC	1- 2	1 1/2	+ 1/8	+9.0
O	DECISION DATA COMPUT	1- 4	2	- 1/8	-5.8
O	DELTA DATA SYSTEMS	1- 1	1/2	0	0.0
N	ELECTRONIC M & M	1- 4	4 1/4	+ 3/8	+9.6
O	FABRI-TEK	1- 2	1 3/8	+ 1/8	+15.0
O	GENERAL COMPUTER SYS	0- 2	3/8	- 1/8	-25.0
N	HAZELTINE CORP	4- 12	10 5/8	+ 1/4	+2.4
N	HARRIS CORP	27- 35	34 1/8	+1 3/4	+5.4
A	INCOTERM CORP	9- 20	13 3/4	+ 3/8	+2.8
O	INFOREX INC	3- 7	5 5/8	0	0.0
O	INFORMATION INTL INC	10- 18	11 7/8	+ 1/2	+4.3
O	INTEL CORP	47-109	51	-4 1/2	-8.1
A	LUNDY ELECTRONICS	3- 7	3 3/8	- 1/8	-3.5
O	MSI DATA CORP	3- 8	7 1/2	+ 1/8	+1.6
N	MILGO ELECTRONICS	15- 37	37 1/8	0	0.0
N	MOHAWK DATA SCI	3- 10	6	- 1/4	-4.0
O	PERIPH CORP	1- 3	3 3/4	- 1/4	-6.2
A	PERTEC CORP	3- 9	7 1/8	+ 3/8	+5.5
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	PRECISION INST.	2- 10	2	0	0.0
O	QUANTOR CORP	4- 6	4 3/4	0	0.0
O	RECOGNITION EQUIP	6- 11	8 1/8	+ 1/2	+6.5
C	SCAN DATA	1- 4	1 3/8	0	0.0
O	STORAGE TECHNOLOGY	9- 13	10 3/4	- 1/4	-2.2
O	T BAR INC	5- 10	9 1/2	+1 5/8	+20.6
O	TALLY CORP.	4- 6	5 1/4	+ 1/4	+5.0
O	TEC INC	3- 9	7 3/4	+ 1/4	+3.3
N	TEKTRONIX INC	45- 69	59 3/4	+2 1/8	+3.6
N	TELEX	2- 5	2 5/8	- 1/4	-8.6
O	WILTEK INC	1- 2	1/4	0	0.0

SUPPLIES & ACCESSORIES

EXCH		1976-77 PRICE RANGE (1)	CLOSE MAR 16 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	BALTIMORE BUS FORMS	3- 5	2 3/4	- 1/8	-4.3
A	BARRY WRIGHT	6- 12	11 1/2	+1	+9.5
O	CYBERMATICS INC	0- 1	1/2	- 1/8	-20.0
O	DUPLEX PRODUCTS INC	13- 24	17 3/8	0	0.0
A	ENNIS BUS. FORMS	6- 8	6	- 1/4	-4.0
O	GRAHAM MAGNETICS	8- 14	12 1/2	0	0.0
C	GRAPHIC CONTROLS	13- 19	14 3/4	0	0.0
N	3M COMPANY	49- 66	53 7/8	+2 7/8	+5.6
O	MOORE CORP LTD	31- 51	32 1/4	+1	+3.1
N	NASHUA CORP	11- 20	18	0	0.0
O	STANDARD REGISTER	15- 21	20 1/4	+ 1/4	+1.2
O	TAB PRODUCTS CO	5- 17	16 3/4	+ 1/4	+1.5
N	UARCO	19- 25	20 3/4	- 1/4	-1.1
A	WABASH MAGNETICS	4- 14	11 3/4	+ 1/8	+1.0
N	WALLACE BUS FORMS	19- 25	19 3/4	+ 3/4	+3.9

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

The Missing Link

The HP 3000 Series II closes the gap between the small business system and the big central computer.

Until recently, that gap was a real problem. For small to medium-sized companies the cost of a big computer was prohibitive. But there was a growing need for extensive batch processing and real-time information management.

Today, the HP 3000 Series II fills that need. A fast, powerful general purpose system, it can handle a wide variety of computing modes at the same time. Yet system prices start as low as $110,000 (U.S. domestic price).

A versatile operating system is the key.

Our Multiprogramming Executive allows the system's resources to be used concurrently. While batch jobs are running, several users can interact with the computer on a time-share basis via terminals (either hard-wired or over phone lines).

Operating speed is maximized with firmware-assisted software. And spooling, standard on all models, keeps the peripherals working at top speed.

Our system has virtual memory, giving you the flexibility to run large programs with a relatively small real memory. And with batch plus terminal capability, you can develop programs at a terminal using our interactive EDITOR—then run them unchanged in batch mode for production work.

The HP 3000 is fluent in COBOL, RPG, FORTRAN, BASIC, APL and SPL (our ALGOL-like Systems Programming Language). These are high-level languages, which the operating system treats alike. The same simple control language statements let you use any programming language.

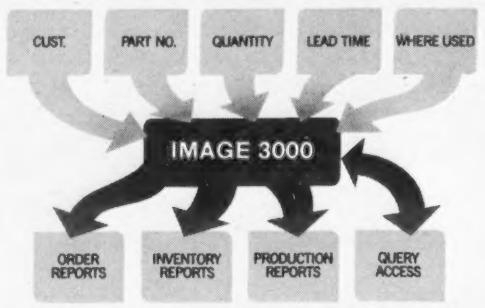
Data Base Management: another "big computer" advantage.

IMAGE/3000, our DBM software package for this system, gives you the means to create and manage a data base. And our simple English-like inquiry language, QUERY, lets you access your data base easily.

You can compile reports, make casual inquiries without writing programs and update data on-line. You can generate forms, titles, page and column headings, data sorted by categories, subtotals, totals and averages.

IMAGE has proved to be such a useful DBM capability that it was named to the 1976 Datapro Software Honor Roll. This places it among the 38 top software products, and one of only three DBM packages, among 1447 rated by computer system users throughout the country.

The software was judged in six categories: ease of installation, throughput efficiency, vendor support, ease of use, documentation and overall satisfaction.



Turning raw numbers into usable information. *All the tools for data base management are provided by our IMAGE/3000 software package and English-like QUERY inquiry language.*

We've made our data management capability even more useful with the addition of KSAM (Keyed Sequential Access Method), giving you fast access to indexed sequential files.

Hardware advances add speed and reliability.

HP's "fault control memory" keeps the CPU running at full speed, even when a memory circuit has failed. Five error-correcting bits in every 21-bit word determine where a fault has occurred and the system compensates for it. A RAM automatically stores the information about the faulty chips. When our Customer Engineer arrives for regular maintenance, he calls up a status report and replaces any faulty circuits—even though everything has been running fine as far as you're concerned.

Fast (350 ns access) semiconductor memory is used, making the CPU easy to expand. In fact, you can go from 128K bytes of mainframe memory to 512K bytes, depending on the system you choose. And disc capacity ranges from 15 to 400 megabytes.

At the heart of the CPU is a 32-bit bipolar ROM-based microprocessor. It contains 209 firmware instructions that execute many system operations normally left to software. This microprogramming speeds up such recurring operations as moving character strings from one location to another, scanning strings for a particular character and environment switching. Processing interrupts and linked list searches are also implemented in microcode, relieving the operating software of considerable overhead burden.

With its power and versatility, the HP 3000 is a natural upgrade for companies outgrowing their small business computers. If you'd like to see it in action, call your nearest Hewlett-Packard office listed in the White Pages. Or write to Bill Krause, Hewlett-Packard, 11000 Wolfe Road, Cupertino CA 95014.

Handling big business problems on a small computer.

With a throughput two to six times greater than the original HP 3000, the Series II is designed to handle batch operations and multi-terminal on-line computation simultaneously.

All components of the system are supplied by Hewlett-Packard, which assures maximum compatibility and minimum service problems. (If anything goes wrong, you know precisely who to call!)

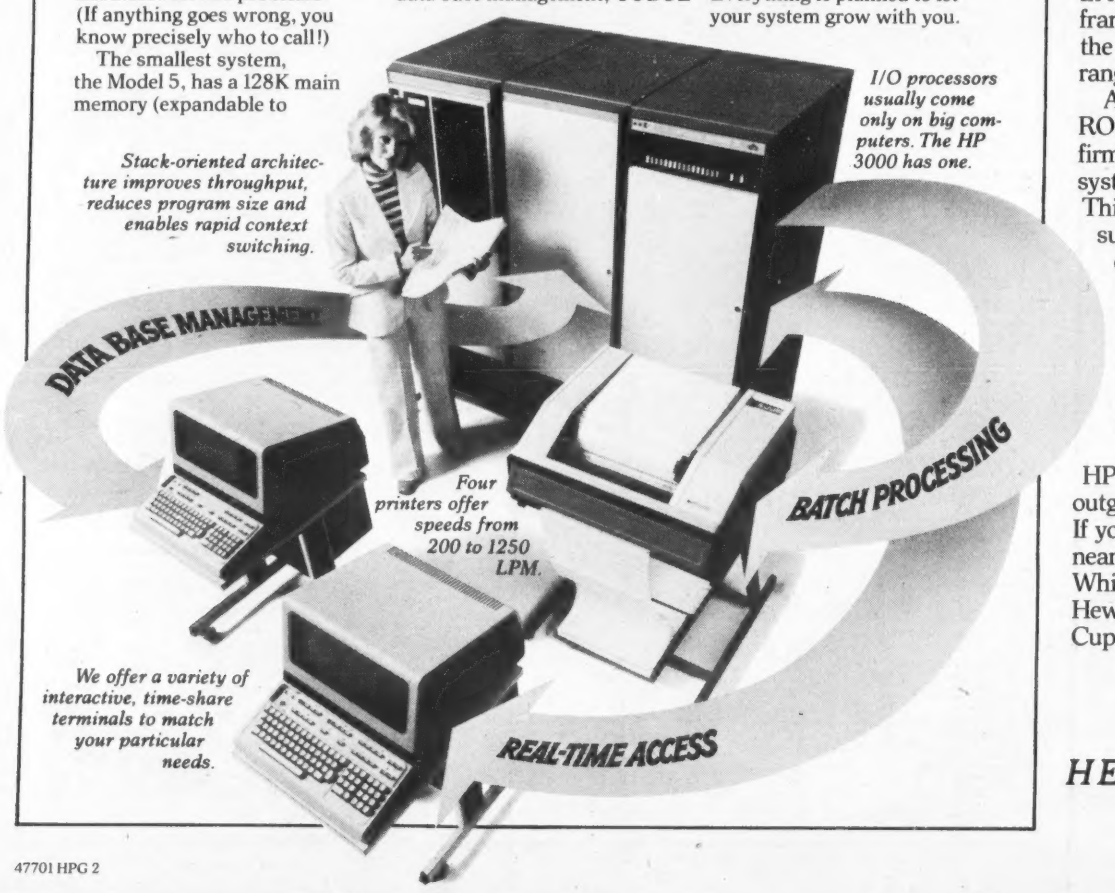
The smallest system, the Model 5, has a 128K main memory (expandable to 256K), plus a 15 megabyte moving-head disc, a 1600-bpi magnetic tape unit, an HP 2640B CRT terminal and a 16-port asynchronous terminal controller.

The Model 7 takes you to 192K bytes of main memory (expandable to 256K), with two 47 megabyte discs, IMAGE data base management, COBOL and RPG. The Model 9 has 320K bytes of main memory (expandable to 512K). IMAGE and five programming languages are standard.

Any configuration can be enhanced with the addition of line printers, card readers and punches, terminals, discs, tapes and more main memory. Everything is planned to let your system grow with you.

Stack-oriented architecture improves throughput, reduces program size and enables rapid context switching.

I/O processors usually come only on big computers. The HP 3000 has one.



Four printers offer speeds from 200 to 1250 LPM.

We offer a variety of interactive, time-share terminals to match your particular needs.

HEWLETT hp PACKARD

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